

GERMANO-EUROPEAN

Breaking the Sound Law

Toby D. Griffen

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For my mother
Gladys Oney Griffen

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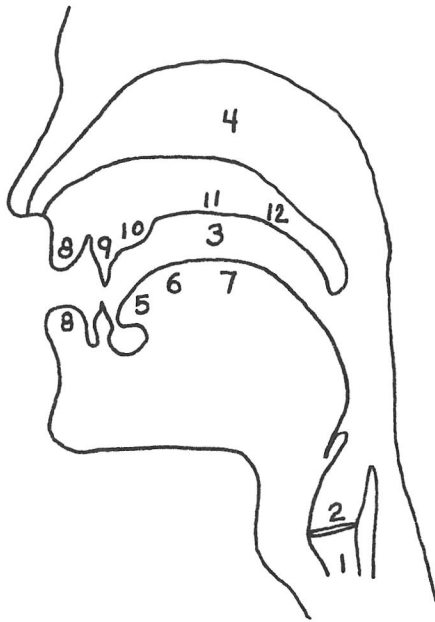
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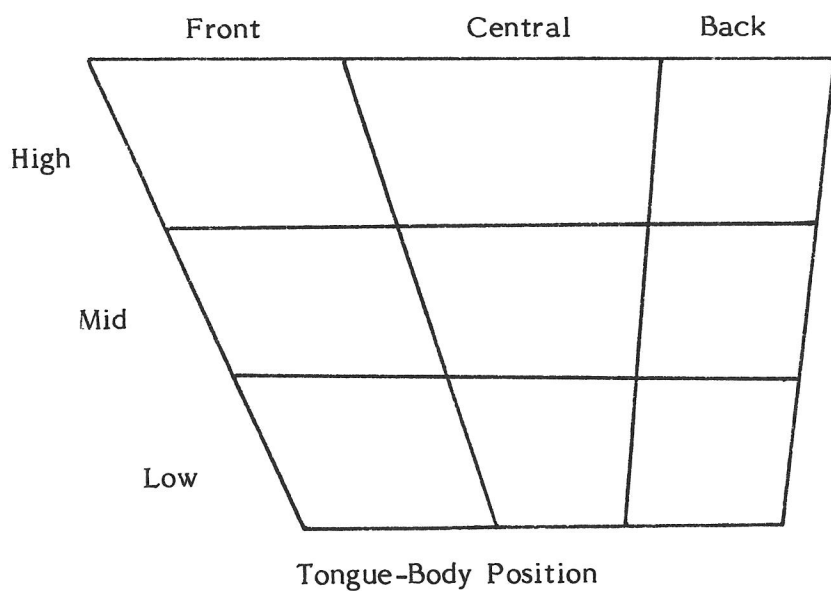


- | | | |
|--------------------------|-------------------------|------------------|
| 1. Larynx (laryngeal) | 6. Blade (frontal) | } Tongue
body |
| 2. Vocal cords (glottal) | 7. Dorsum (dorsal) | |
| 3. Oral cavity (oral) | 8. Lips (labial) | |
| 4. Nasal cavity (nasal) | 9. Teeth (dental) | |
| 5. Apex (apical) | 10. Alveolum (alveolar) | |
| | 11. Palate (palatal) | |
| | 12. Velum (velar) | |

B. CONSONANTS

bilabial stop	p	English <u>pat</u>
	b	English <u>bat</u>
bilabial fricative	ɸ	Spanish <u>lobo</u>
bilabial nasal	m	English <u>mat</u>
labio-dental fricative	f	English <u>fat</u>
	v	English <u>vat</u>
labio-dental affricate	pf	German <u>Pferd</u>
apico-dental/alveolar stop	t	English <u>tie</u>
	d	English <u>die</u>
apico-dental/alveolar nasal	n	English <u>nigh</u>
apico-dental fricative	θ	English <u>thigh</u>
	ð	English <u>thy</u>
apico-dental sibilant	s	English <u>sue</u>
	z	English <u>zoo</u>
fronto/dorso-palatal stop	c	English <u>key</u>
fronto-palatal fricative	ç	German <u>ich</u>
fronto-palatal sibilant (grooved)	ʃ	English <u>sure</u>
	ʒ	English <u>azure</u>
fronto-palatal affricate	tʃ	English <u>choose</u>
dorso-velar stop	k	English <u>coal</u>
	g	English <u>goal</u>
dorso-velar nasal	ŋ	English <u>song</u>
dorso-velar fricative	x	German <u>ach</u>
	ɣ	Greek <u>gamma</u>
glottal stop	ʔ	English <u>uh-uh</u>
glottal fricative	h	English <u>hut</u>
lateral fricative	ɬ	Welsh <u>llan</u>
liquids	l	English <u>lead</u>
	r	English <u>read</u>
glides	w	English <u>wet</u>
	j	English <u>yet</u>

C. VOWELS



high front	i:	English <u>eat</u>
high front rounded	y:	French <u>une</u>
mid front	e:	English <u>eight</u>
mid front open	ɛ	English <u>ebb</u>
mid front rounded	ø:	German <u>Goethe</u>
low front	æ:	English <u>at</u>
high central	ɨ:	Welsh <u>ty</u>
mid central	ə	English <u>but</u>
low central	a:	English <u>hot</u>
high back	u:	English <u>toot</u>
mid back	o:	English <u>tote</u>
low back	ɔ	English <u>taught</u>

D. DIACRITICS

k ^h	aspirated
k ⁼	deaspirated
kʔ	glottalized
k	palatalized
l ^o	voiceless
l̥	syllabic
ɫ	velarized
ˈ	accented syllable
ẽ:	long
e	nasalized
[k]	phonetic
/k/	phonemic
<u>k</u>	orthographic
[<u>d</u>]	murmured
*	reconstructed
>	changed to
<	changed from

And other diacritic markings in the various
orthographies of languages

PREFACE

Ever since the discovery of Indo-European early in the last century, some basic assumptions have held sway over linguistic scholarship in this field of Indo-European studies. Because the classical languages of Greek and Latin were written down earliest, it was assumed that these represented the oldest stages of the language family. Moreover, with the discovery by Europeans of the third classical language, Sanskrit, it further was assumed that this Indic language must have been the closest of all to the original Indo-European protolanguage.

Linguists today would readily dispute the assumptions by which Greek, Latin, and Sanskrit have been thought to maintain the most conservative forms--the forms closest to the original. However, in classes on historical linguistics and Indo-European, the same old material is being taught. This creates an inconsistency, for in classes on linguistic theory and methodology, information is being provided that would challenge the conservatism of the classical languages; while in classes on Indo-European, Grimm's Law prevails, establishing the classical languages as being more conservative than Germanic, as though there were no reason to doubt its underlying assumptions that directly contradict linguistic

theory and methodology.

What this volume does is to present the evidence of dynamic phonetics in order to demonstrate that the original consonant system of Indo-European (or Germano-European) was much closer to that of Germanic than to those of the classical languages. As this consonant system is the realm of Grimm's Law, the implications of restructuring it are very serious for the traditional view of the development of the Indo-European languages.

The method used in this book can be traced through the five chapters. In Chapter 1, we examine the theoretical and methodological foundation of historical linguistics and the sound law. By examining correspondences between sounds in two or more languages, we can determine by the reliability of one's being predictable from the other that two or more languages are more or less closely related. If we can predict a sound (or better, a group of sounds) in one language from that of another (but not vice versa), then we can construct a sound law by which we say that the first sound changes into the second by some general principle. Through this method of predicting one form from the other, we can use these sound correspondences to extrapolate back into the preliterate past to speculate on what the original sound system may have looked like, and we can thus reconstruct the sound in the protolanguage.

The general principle by which the sound law is constructed may be derived from one or more of the following areas: Areal linguistics provides a rationale for considering a dialect spoken in one type of region (for example, an iso-

lated mountainous region) to be more conservative than that spoken in another type of region (for example, a major commercial route). Language typology derives from observations of changes that have been recorded in history and provides some measure of probability or at least of precedence that a language of a certain type would undergo a change from one particular kind of sound to another. Finally, phonetic plausibility is the most reliable area for justifying sound laws, for it examines the phonetic detail in order to determine the plausibility that one sound could change to another within a phonetic system with certain characteristics.

In Chapter 2, we examine the traditional sound laws. It is important to note that the concepts of the sound correspondence and sound law go back well into the Middle Ages and were not an invention of the Indo-Europeanists of the early nineteenth century. When those Indo-Europeanists did construct their sound laws, however, they based their work not so much upon the traditional scholarship as upon assumptions such as those noted above. For instance, they assumed that the racial Indo-Europeans originated in the East and that their language was rich in inflections, which were then subject to the inevitable entropy of language over time. Such notions have since been determined to be without foundation; yet, they form the basis of Grimm's Law, establishing the classical languages as conservative and deriving the Germanic languages as an innovation.

Moreover, recent developments in phonetics and phonology have completely obviated the phonological foundation for the change posited in Grimm's Law. When we examine

the phonetic detail of the sounds within their systems, we find that phonological systems simply cannot change in the manner the Indo-Europeanists predicted. For example, where accent is not a factor, a consonant [d] between vowels does not tend to become [t] (becoming less like the vowels in its environment), but rather the [t] tends to become more like the vowels and changes to [d].

To understand the importance of this phonetic and phonological evidence, we treat dynamic phonology in some detail in Chapter 3. In this chapter, we see the phonetic detail behind such crucial factors as the consonant-vowel relationship, and we see why a particular type of change is considered plausible while another is considered implausible. This presentation is the focal point of the work, for it provides the source of the evidence from linguistic theory and methodology that directly contradicts the traditional view of the first Germanic sound shift of Grimm's Law and turns it into the Indo-European sound shift.

In Chapter 4, the theory and methodology of Chapter 3 are used to create a new, more reliable view of the sound correspondences relating Germanic with the rest of Indo-European. We see that the protolanguage's consonant system was arranged along the fortis-lenis scale, a point readily acknowledged by the traditional Indo-Europeanists. However, we delve further into the phonetic detail that makes up the fortis-lenis scale and discover that the precise phonetic feature through which the fortis-lenis scale was organized was aspiration--not the aspiration found only in the puff of breath after the initial consonant in a word such as pill (as

opposed to the lack of aspiration in spill), but an aspiration that is characterized by complex physiological and acoustic characteristics.

When we examine the Germanic and Indo-European data in the detail of the fortis-lenis scale based upon aspiration in a dynamic phonetic/phonological framework, we discover that Grimm's Law is almost completely backwards. On the basis of the plausibility of changes in an aspirate fortis-lenis system, we reconstruct a protolanguage consonant system from which Germanic develops along predictable lines and also from which Indo-European shifts in predictable ways in a plausible, credible manner. There is no need for arbitrary sound laws based upon external assumptions, for the developments that take place are totally in keeping with the phonetic tendencies of change expected within a phonological system.

From these developments, we then construct a "family-tree" diagram with Germanic and Armenian as the most conservative members of the Germano-European language family. Of course, this tree is constructed in isolation from other factors in the languages involved, and adjustments will have to be made as other linguistic evidence is combined with the Indo-European sound shift. Nonetheless, the examination of the data through recent phonetic evidence provides us with a more reliable starting point from which to reassess our organization of the language groups of this extensive family.

While phonetics provides the most reliable evidence for determining the direction and type of sound shift, other

areas provide valuable corroboration for the determinations made in Chapter 4. In Chapter 5, this evidence is organized by area: areal linguistics, language typology, and anthropology. The support from areal linguistics rests not only upon the position of Germanic but also upon that of Armenian. With the two language groups sharing much the same consonant system, all areal linguistic criteria would indicate that Germanic and Armenian are more conservative than the other Indo-European language groups.

In typology, the glottalic theory is examined and compared with the evidence presented in this book. While this theory and typological linguistics in general are not considered to be as reliable as phonetic plausibility, there is a high degree of correspondence between the findings of the typologists and those presented here. Certainly, there is enough agreement to call into question the basic assumptions underlying Grimm's Law and to develop a theory more in keeping with the findings in this work.

Finally, the physical evidence from anthropology is cited to show that the original Indo-Europeans were a cultural group (not a race) that migrated to Europe and to India about the same time (making Sanskrit no more ancient than the rest of the languages). Furthermore, the routes of migration would support the finding that Germanic and Armenian occupy region that would corroborate their position in the Germano-European tree developed in Chapter 4.

While some will view this book as radical or even as revolutionary, it is based upon a linguistic tradition that goes back to Giraldus Cambrensis and that incorporates the

most reliable evidence of modern dynamic phonetics in a manner totally in keeping with traditional phonology. The only aspect that is innovative is the application of this evidence and this tradition to the data used to support Grimm's Law. While the effect of this application may be seen as revolutionary, the method is quite conservative.

I should like to thank Southern Illinois University at Edwardsville for providing a research scholar award and a sabbatical for the preparation of this work. The generosity of the University and of the Graduate School in particular has been greatly appreciated. I would also like to thank the publishers and editors of Southern Illinois University Press for their time, effort, and patience in the publication of this work and to thank their referees for the insightful and helpful comments on the manuscript.

CHAPTER 1

SOUND LAWS: PRINCIPLES AND PRACTICE

For thousands of years, the Indo-European languages have been spread all over the world by their expanding cultures. The extent of this expansion can be seen most graphically on the map in figure 1-1. Of course, much of this expansion has been carried out in the recorded history of the Italics, with the subjugation of Europe under the Romans and the colonization of the New World under the Spaniards, Portuguese, and French, and also in the recorded history of the Germanics, with the phenomenal imperial dominion of England, still seen today in the British Commonwealth.

Precisely how these cultures originally established themselves, how they developed apart from one another, and how they first expanded in Europe and India, dividing over and over again, remain tantalizing riddles, for all of this development occurred well before the first word was ever written down in any of their languages. To solve these riddles, we must examine what has been left to us, and this legacy consists mainly of these very same languages, descendants of the ancestral speech uttered by the first Indo-Europeans.

Thus, we must determine the origin of the languages by



Fig. 1-1. Distribution of Indo-European languages

using these languages themselves and whatever reasonable methods we can come up with to demonstrate precisely how these languages are related. Using language to figure out language introduces a host of potential difficulties, circular reasonings, and inferences. However, if we approach the matter scientifically and cautiously enough, introducing a minimum of preconceived notions and working as closely as possible with the most consistent evidence at hand, then we should be able to glean some understanding from the vast amounts of data. To provide such an approach, linguists have developed methods that rely upon the correspondences among sounds and forms in the various languages in order to determine the rules governing these correspondences and ultimately to reconstruct the historical application of these rules in the right order.¹

We shall examine first of all what we mean by a correspondence. As this book is concerned with a sound shift, we shall be most interested in correspondences among sounds (as opposed to endings, roots, prepositions, and so forth). Next we shall see how the regularity with which these correspondences appear leads to the establishment of a sound law. Then in the following chapter, we shall look closely at the traditional sound laws developed to explain how Germanic split off from the rest of the Indo-European language family.

1.1 SOUND CORRESPONDENCES

The sound correspondence² is not a thing that can be explained satisfactorily in the abstract, for it is really a concrete bit of sound-related (or phonetic) evidence that we must use to construct our theories and reconstructions. These correspondences have come into being both within recorded history and in the prehistoric past (by which I mean before the development of writing, which provided a written history).

First, however, let us take a look at a general example that may serve to show how correspondences are used in determining language relationships. In table 1-1, we find sound correspondences that appear in the numbers from one to ten. We should notice right off that the words in Greek, Latin, and Welsh look very much alike, indicating that the languages are related to one degree or another. If our vision should be clouded by the slight differences among these Indo-European numbers, we need only compare this group with the non-Indo-European numbers found in Hungarian and Chinese.

In those letters that are double-underscored, all three of the languages agree completely; while in those that are single-underscored, two of the languages agree. For example, the tr in 'three', the n in 'nine', and the d in 'ten' all correspond exactly. In the Hungarian and Chinese, on the other hand, there is no such correspondence.

Moreover, there are other correspondences as well. For

Table 1-1. Numbers from One to Ten

	Greek	Latin	Welsh	Hungarian	Chinese
1	heĩs	ū <u>n</u> us	un <u>u</u>	egy	yī
2	duō	duo	du <u>u</u>	kettő	èr
3	treĩs	trēs	trwy	három	sān
4	tét <u>t</u> ar <u>e</u> s	quattuor	pedwar	négy	sì
5	pén <u>t</u> e	quin <u>q</u> ue	pump	öt	wǔ
6	hén <u>x</u>	sex	chwech	hat	lyòu
7	heptá	septem	saith	hét	chī
8	oktő	octō	wyth	nyolc	bā
9	ennéa	novem	naw	kilenc	jyǒu
10	dék <u>a</u>	decem	deg	tíz	shí

example, every time Latin has an initial s, as in the words for 'six' and 'seven', Greek has an initial h. This is no accident, as we see in many other correspondences, such as Latin sēmi- to Greek hēmi- 'half'. Furthermore, we see the same sort of correspondence between Latin qu and Welsh p, as in the words for 'four' and 'five'.

1.1.a Correspondences in History

To see how such correspondences are used in determining closer relationships with a known history, let us compare table 1-1 to table 1-2, in which we find the numbers in Latin, Italian, Spanish, and French.³ From recorded history, we know that Italy, Spain, and France were totally dominated by Rome for centuries, and that Rome imposed the Latin language in all of these areas. It should come as no surprise, then, that there is a remarkably high number of exact correspondences among these languages; indeed, the modern languages are relatively recent derivatives of Latin.

By comparing table 1-1 with table 1-2, moreover, we should be able to make a significant conclusion. The regularity and the closeness of sound correspondences is directly proportional to the degree of relatedness among various languages. Thus, the modern Italic languages in table 1-2 can be judged as very closely related, while Welsh and Latin can be seen to be more closely related to one another than either of those languages is to Greek. As we might suspect, though, this is something of an oversimplification, for other developments in a culture can cause a more rapid diversifi-

Table 1-2. Numbers from One to Ten in Italic

	Latin	French	Italian	Spanish
1	unus	un	uno	uno
2	duo	deux	due	dos
3	tres	trois	tre	tres
4	quattuor	quatre	quattro	quattro
5	quinque	cinq	cinque	cinco
6	sex	six	sei	seis
7	septem	sept	sette	siete
8	octo	huit	otto	ocho
9	novem	neuf	nove	nueve
10	decem	dix	dieci	diez

cation between two related languages, a point addressed in section 1.3.a. Nevertheless, as we examine the principles that support the sound laws, the basic tenet outlined above is reasonable in theory and certainly instrumental to our methodology of investigation.

Through these examples, we should have developed an appreciation for the sound correspondence and its place in comparative linguistics. If we were to define it in the abstract, we could say that a sound correspondence consists of a pair of sounds, one within a word in one language and the other in the same part of the cognate word of a related language, which are either the same or predictably different (compare section 2.3.a). At this point, sounds are not distinguished from letters, though this distinction will prove to be important later in this work.

By the regularity with which these correspondences appear in the data from several languages, we can further delineate "families" and "subfamilies" of languages.⁴ We see quite clearly how the correspondences separate the Indo-European languages from languages of other families (the Hungarian of Finno-Ugric, the Chinese of Sino-Tibetan, and so on). We see, too, how they can (if used with caution) show more precise relationships. For example, the Celtic subfamily, or group, of which Welsh is a member, is far more closely related to Italic than it is to Greek, and the various Italic languages are far more closely related to one another than they are to Celtic. Many scholars have suggested that in the breakup of Indo-European, a Celto-Italic subfamily already quite separate from the Greek subfamily existed as

a single group before breaking up further into Celtic, on the one hand, and Italic, on the other.⁵ Indeed, in another branch of Celtic, of which Irish is the most prominent member, the p's that differentiate the Welsh from the Latin (with its qu's) are realized as c's: the Old Irish word for 'five' is coic, which is much closer (at least in these consonants) to quinque.

In all such correspondences, though, the linguist must proceed with a great deal of caution, especially with a large number of words in the data base, or "corpus." For example, if we were just to compare Welsh wyth [uɪθ] 'eight' with the corresponding French huit [uit], we would conclude that Welsh and French are extremely close and that they should perhaps be in the same group. This hypothesis would be supported further by the the French counting by twenties for numbers greater than sixty, just as do the Welsh in the traditional counting system. For example, French quatre-vingt dix 'ninety' is literally 'four-twenty ten' and corresponds precisely to Welsh pedwar ugain a deg 'four twenty and ten'. In fact, if we wanted to press the point, we could refer to many grammatical similarities between the two languages, such as the practice of prefixing the pronoun object to the verb.

All of these Welsh-French correspondences, however, are very misleading. First of all, if we expand our corpus to include all of the pertinent forms, we would find that the seemingly close relationship between Welsh and French is far overshadowed by that between Latin and French. Moreover, from our study of history, we know exactly why such

isolated correspondences exist between Welsh and French--when the Romans conquered Gaul, they imposed their language upon a population that spoke a Celtic language so close to Welsh that the Gauls and the Britons could communicate with one another (as pointed out by Julius Caesar).⁶ What we have here, then, are remnants from a Celtic "substratum"--a language still spoken well after Latin was imposed. To claim that these correspondences support a hypothesis placing French among the Celtic languages is roughly analogous to claiming that English is an American Indian language on the basis of the many Indian place names in the United States and Canada.

1.1.b Correspondences from Prehistory

The sound correspondence is a vital tool for language investigation, but it must be used with caution. Given a sufficient corpus and, as seen above, as much knowledge of history as possible, it enables us to determine relationships among the various languages of the Indo-European language family. I cannot overemphasize that we must temper those judgments based upon linguistic evidence with as much evidence from other sources as possible. Language is not spoken in a vacuum; it is an integral part of a culture with a complete social order and a peculiar history.⁷

But what if we do not have sufficient information about the society and history of the culture under study? Put more specifically, what if we are studying a prehistoric language? This is indeed what we are doing in our investigation of the

various Indo-European language groups and their common ancestor. In such a case, we must rely upon our methods of determining relationships through sound correspondences (and through grammatical correspondences as well, though that is beyond the scope of this volume).

For example, if we did not know the history surrounding the correspondences in tables 1-1 and 1-2, we would have to compare all of the correspondences equally. Of course, the first conclusion would be that Hungarian and Chinese are not in the same language family as the others. We would then notice that the strongest exact correspondence pattern is found among Latin, French, Italian, and Spanish, and we would place these in one group. As noted above, Welsh would be closer to this group than to Greek. This would lead to a logical-tree relationship or a "Stammbaum" as illustrated in figure 1-2.⁸

We should note in this figure that Latin is placed equal to the other Italic languages. Just on the basis of these ten words and without access to historical information, we cannot conclude that Latin is really the ancestor of the others. Given more correspondences (a much larger corpus), however, this conclusion can be reached.

By using the tool of the sound correspondence, we can establish family relationships. More than this, however, in establishing these relationships for periods of prehistory, we can gain significant insights into how the cultures diversified (or broke up) in these prehistoric periods. By tracing back along the various branches of the tree, we can come to some reasonably reliable conclusions about what migrations

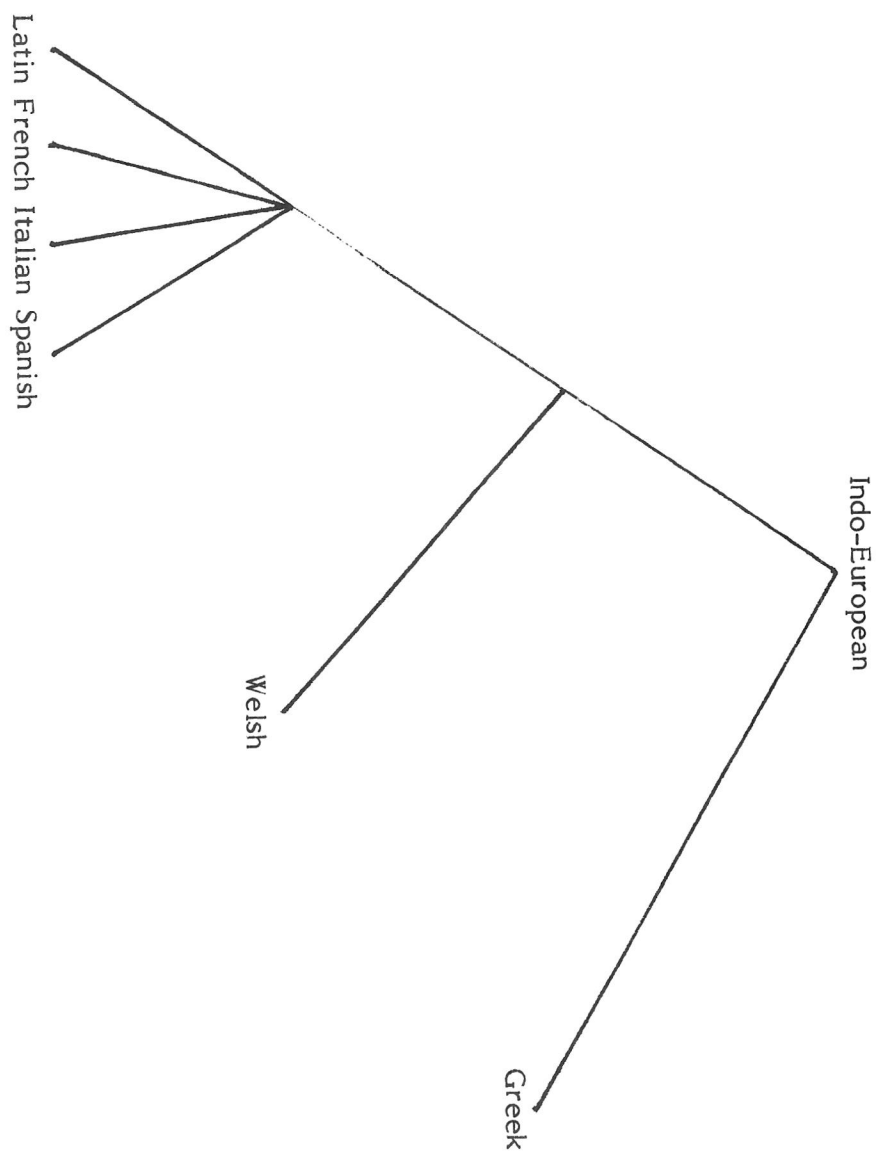


Fig. 1-2. Tentative family relationships

took place among our cultural ancestors, what order they occurred in (if not when), where they led from and where they led to (though here anthropological evidence should provide crucial corroboration).⁹

Furthermore, if we are extremely cautious, we can examine evidence from various Indo-European languages as well as non-Indo-European languages and come to some understanding of just how close relations were among various cultures. For example, we see in the correspondences between Welsh and French as opposed to those between French and Latin that there is a close affinity between the former pair that is overshadowed by that between the latter pair. Taking all of the linguistic evidence together (but ignoring for the moment what we know from written history), the most likely explanation is that Latin was imposed upon a substratal language (a language of a dominated people)¹⁰ closely akin to Welsh. Other explanations would include wholesale borrowing or even a late imposition of Welsh upon French (much as French was imposed upon English after the Norman conquest), though these appear far less likely.

The sound correspondence, then, is valuable not only in determining language relationships, but also in determining prehistoric cultural relationships. It can shed enough light upon a corner of prehistory that we can, with a great deal of circumspection, speak of that corner as partially extending into known "history." At the very least, such evidence can be invaluable in assisting anthropologists to investigate certain areas for particular types of physical evidence,

which, if it corroborates the linguistic evidence, makes us more confident of our conclusions.

There are two parts to the method in which we use our tool, the sound correspondence. The first is that which has been demonstrated at length above--the comparison of cognates, of corresponding forms. Another part is somewhat hidden in the demonstration and relates directly to the sound law itself. In the discussion concerning table 1-1, we noted that some correspondences are not exact, but are definitely predictable. For example, wherever we see a Latin qu, we can predict that Welsh will have a corresponding p. Hence, the fact that the qu in Latin quattuor 'four' corresponds to the p in Welsh pedwar leads us to predict the same in the correspondence between Latin quinque 'five' and Welsh pump. Given a Latin word such as quis 'who', we should thus look for a corresponding Welsh word for 'who' that begins with p--and we find pwyl.

We can look upon such a predictability as adhering to some sort of a rule or law of correspondence. In such a case, we could simply state that Latin qu equals Welsh p, or that Latin initial s equals Greek h. While this may be an extremely accurate and cautious way of presenting the evidence from sound correspondences, it tells us nothing about the history behind the correspondences.

Somewhere in the prehistoric past, an original sound changed in one or both languages to yield these correspondences. If we could come up with a reliable hypothesis of what that sound was, then we could develop rules or laws from the original, compare the various routes taken by the

languages under study, and trace the sound changes along the branches of the tree diagram above, thus mimicking the family relations. This would give us a much more useful method of determining sound and language relationships.¹¹

To trace this development of sounds and to gain insights into the development of languages, their relatedness, and their common and individual histories, linguists have created the sound law, which is treated further in the following section. Stated simply here though, we can see how a sound law works by examining the Latin-Welsh correspondence immediately above. On the basis of several factors outlined below, we determine which form is the more conservative--which has changed the least from the original "protoform." Let us say for the sake of illustration that the Latin qu is virtually the same as the protoform. According to the appropriate sound law, each and every occurrence of this hypothetical *qu in the protolanguage (wherein the asterisk denotes a reconstructed form) changes to p in Welsh in accordance with the formula *qu > p. The symbol ">" may be read "changes to," while the symbol "<" may be read "changes from." This method should become clearer and more accurate in the following sections dealing with sound laws.

1.2 SOUND LAWS

So far, we have seen how sound correspondences indicate degrees of relatedness among various languages within the same family and how these degrees of relatedness can

be used to trace the development of the language family and its various parts through history and even back into pre-history. The method of investigation relies heavily upon the concept of the sound law.¹² As with the correspondence, we cannot fully appreciate the sound law through any abstract definition; rather, we should first examine how it is developed and used and what constraints and criteria are placed on its use.

1.2.a Indo-European Sound Correspondences

To understand what a sound law is and how it works, let us examine a much larger corpus. As noted in the previous section, accuracy in comparative linguistics is achieved to a degree directly proportional to the amount of data examined and accounted for in analysis. This corpus is listed in table 1-3, and includes carefully selected related words from several Indo-European language groups.¹³ For the sake of simplicity and clarity, so that we can immediately see the forms being compared, the sound under study is the stem-initial sound.

The first thing that should strike us about these data is the remarkably high degree of sound correspondence among them. Certainly, there are holes in the correspondences. For instance, we see that Celtic has lost its *p*, so to speak, resulting in the correspondence between Latin *p* in pater 'father' and Old Irish zero in athir. Such a hole ought not bother us, for the general pattern is unaffected--there is not a series of such zero correspondences throughout the

data.

Nor are we bothered by the occurrence of Sanskrit ṣ, where Latin often has c ([k]). This particular correspondence has long been used as the criterion for dividing the Indo-European languages into two great groups of subfamilies--the satem division and the centum division (from the word for 'hundred' in Avestan and in Latin, respectively).¹⁴ In spite of its prominence in classifying languages and groups of languages, this correspondence is still isolated in the sense that only these sounds are affected, and not the general patterning of correspondences.

What is of great concern to us is the corpus from the Germanic languages. Here, there appears to have been wholesale change affecting almost the entire consonant system. If we simply look at the letters and do not consider the actual sounds represented in those letters (the phonetic substance), then the differences between Germanic and the other Indo-European language groups may appear to be immense. Indeed, if it were not for the fact that the correspondences included here are in fact regular throughout the Germanic languages (for example, every initial f corresponds to an initial p in Latin and Greek), we might doubt the close relationship between Germanic and the other Indo-European subfamilies.

The substance of the sounds behind the letters, however, tells a different, more consistent story. As we shall see in far greater detail in the following chapters, sounds are made up of various pertinent characteristics that classify them into groups. The sounds represented in Sanskrit by the let-

Table 1-3. Indo-European Consonant Correspondences

<u>Sanskrit</u>	<u>Greek</u>	<u>Latin</u>
Susurratae (see text below)		
bhāráti carries	phérō I carry	ferō I carry
bhāvati is	phúō I beget	fuī I have been
bhrātar brother	phrētēr fellow	frāter brother
dādhāti he sets	títhēmi I set	abdere to do away
dhāya-h nourishing	thēsato she nursed	femina woman
dhar- to hold	thrānos bench	frē-tus relying
hāmsá-h goose, swan	khān goose	ānser goose
hāri blond	khólos gall	fei gall
hārsatē becomes stiff	khērsos continent	horrēre to be rough

Table 1-3 (continued)

<u>Celtic</u>	<u>Germanic</u>
biru (OIr) I carry	baíran (Goth) to carry
bod (W) to be	bauan (Goth) to inhabit
brātha(i)r (OIr) brother	brōþar (Goth) brother
dede (Gall) to do	dōn (AS) to do
dynu (W) to nurse	daddjan (Goth) to nurse
dryd (W) thrifty	darian (Goth) to carry
gēiss (OIr) swan	gans (OHG) goose
gel (OIr) white	gall (Olc) gall
garw (W) rough	gorst (AS) broom (plant)

Table 1-3 (continued)

<u>Sanskrit</u>	<u>Greek</u>	<u>Latin</u>
Mediae		
budbuda-ḥ water bubble	buzón closely	bucca cheek
dēvá-ḥ god	dīos god	deus god
dunōti burns	daiō I ignite	duellum war
dváu two	dúō two	duo two
jaḥāna is born	gēnna birth	genitus born
hānu-ṣ chin	gēnus chin	gena cheek
jōsati costs	geuomai I cost	dēgūnere to cost
Tenues		
pad foot	pōs foot	pēs foot
pātra feather	pterōn feather	penna feather
pitār father	patēr father	pater father

Table 1-3 (continued)

<u>Celtic</u>	<u>Germanic</u>
buiden (OIr) troop	poki (ON) sack
dia (OIr) god	fivar (ON) gods
dōim (OIr) I burn	tjōn (ON) injury
dau (W) two	twai (Goth) two
geneth (W) girl	kundr (ON) son
gen (W) chin	kinnus (Goth) chin
asa-gū (OIr) wishes	kausjan (Goth) to cost
īs (OIr) foot	fōtus (Goth) foot
aterin (OW) bird	fedara (OHG) feather
athir (OIr) father	fadar (Goth) father

Table 1-3 (continued)

<u>Sanskrit</u>	<u>Greek</u>	<u>Latin</u>
tanú thin	tanu- long	tenuis thin
tráyaḥ three	treĩs three	trēs three
tvám thou	tú thou	tū thou
śatám hundred	hekatón hundred	centum hundred
śētē lies	keĩtai lies	civis citizen
śaraṇá- protecting	kalĩā protection	occulere to hide
kapatĩ two hands' full	kapétis measure	capere to capture
uṣā-kala cock	kalēō I call	calāre to call out
kravís raw flesh	kréas flesh	cruentus bloody

Table 1-3 (continued)

<u>Celtic</u>	<u>Germanic</u>
tan(a)e (OIr) thin	þunnr (OIc) thin
tri (W) three	þreis (Goth) three
tū (OIr) thou	þu (Goth) thou
cant (W) hundred	hund (Goth) hundred
cōim (OIr) dear	heiwa-frauja (Goth) lord of house
celu (W) to hide	helan (OHG) to hide
caeth (W) slave	haptr (ON) captive
cailech (OIr) cock	hlōwan (AS) to roar
crau (W) blood	hrā (AS) raw

NOTE: O = Old. Celtic: Gall = Gallish, Ir = Irish, W = Welsh. Germanic: AS = Anglo-Saxon (Old English), Goth = Gothic, HG = High German, Ic = Icelandic, N = Norse.

ters bh, dh, gh were all produced in the same way at the lips, the teeth, and the back of the mouth, respectively. While the precise manner in which they were produced is open to some conjecture, they were probably [b], [d], [g] spoken with murmur--the breathiness heard in Sindhi and other Indian languages today.¹⁵ In other languages, the equivalent could be [ɸ] (or[v]), [ɸ], [ɸ]--or [b], [d], [g] spoken without stopping the air, as in English v or the th in then. I shall break with tradition in naming this group only because the traditional name (voiced aspiratae) is misleading and at odds with phonetic plausibility (see section 1.3.c), and I shall coin the term "susurratae" (Latin for 'whispered, murmured') for this group of consonants.

While the susurratae are the most weakly articulated sounds among the consonants, the "mediae" (voiced stops) [b], [d], [g] are the next stronger group--pronounced as the initial consonants in English bane, dane, gain. The next stronger group consists of the "tenues" (voiceless unaspirated stops) [p], [t], [k] and are pronounced as the p, t, k in English spill, still, skill. The tenues are pronounced without aspiration, or the puff of breath that comes after the p, t, k in English pill, till, kill. This last group of sounds is the "aspiratae" (voiceless aspirated stops) [p^h], [t^h], [k^h].

Traditionally, the aspiratae have included not only the aspirated stops [p^h], [t^h], [k^h], but also the fricatives [f], [θ], [x], as found in English fin and thin and at the end of Scottish loch or German Bach. To avoid the confusion between aspirated stops and fricatives that will assuredly arise in the theory being expounded in this book, I shall use the more

traditional term for these fricatives--"spirants" (voiceless fricatives).

Thus, we can speak of five degrees of consonants, six, if we include the affricatae--such as the pf of German Pfennig 'penny'--in between the aspiratae and the spirants. Progressing from the weak, or lenis, to the strong, or fortis, we can construct a visual display of consonant values as in figure 1-3. In constructing this figure, we also define the terms we need in order to come to grips with the correspondences between Germanic and the other Indo-European languages.

Returning to the corpus in table 1-3 and bearing in mind the phonetic substance underlying the letters in the table, we can now see that the correspondences between Germanic and the others are actually quite simple, neat, and regular. Where the other Indo-European language groups have *tenues*, Germanic has spirants (h in the older Germanic languages was pronounced [x]); where the other Indo-European sub-families maintain *mediae*, Germanic maintains *tenues*; and where Sanskrit has *susurratae* (which appear to be more conservative than those of the other non-Germanic languages), Germanic has *mediae*.¹⁶

To make things even tidier, we can note that where the other Indo-European groups have more lenis consonants, Germanic has more fortis. Moreover, if we remove the columns from figure 1-3 that are not used in the correspondences (that is, that are not pertinent to them), we discover that in each and every case, the difference between the Germanic and the other Indo-European sounds can be de-

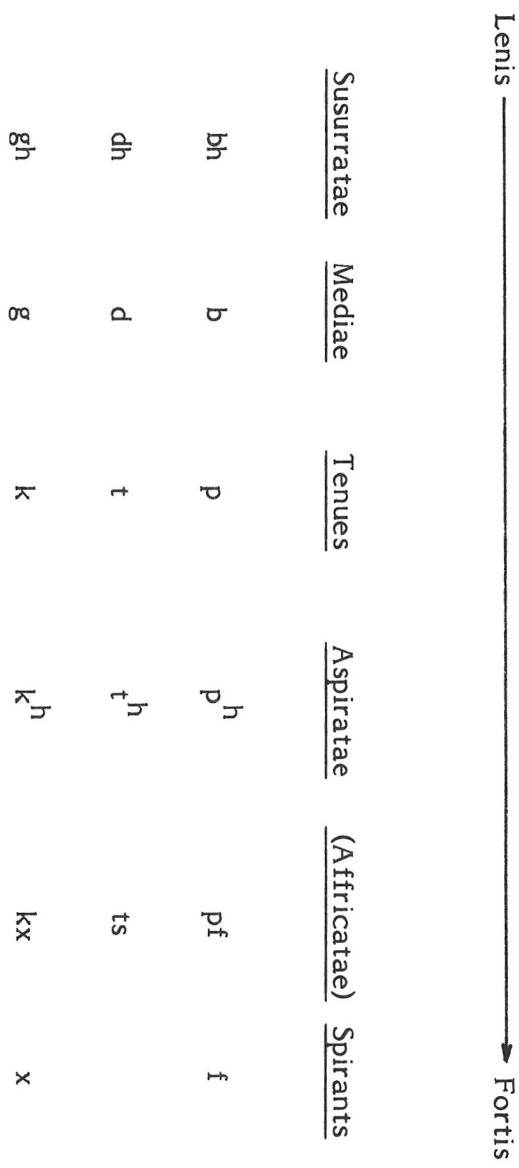


Fig. 1-3: Consonants along the fortis-lenis scale

scribed as a difference in one (pertinent) degree along the fortis-lenis scale, as we see in table 1-4.¹⁷

1.2.b The Question of the Sound Laws

Perhaps the most significant aspect of the regularity and neatness of these sound correspondences for us is that simple and direct sound laws can be derived from them. That is to say, once we establish which system (Germanic or non-Germanic) is the more conservative, then we can write sound laws such as $\underline{dh} > \underline{d}$, $\underline{d} > \underline{t}$, $\underline{t} > \underline{\theta}$ or, conversely, $\underline{\theta} > \underline{t}$, $\underline{t} > \underline{d}$, $\underline{d} > \underline{dh}$, and exactly the same for the labials and velars. Furthermore, as the change itself is so regular along the fortis-lenis scale, we can state the sound law even more succinctly as $X > X+1$ or $X > X-1$, depending upon whether we see the change as occurring from lenis to fortis or from fortis to lenis.

Finally, I should point out that the great degree of generality with which the sounds at each position of articulation are formed (labial, dental, velar--and many would add the labio-velar as in Latin quis)¹⁸ would indicate that whichever way the sound law goes, it represents a sound shift. For now, we can define a sound shift as simply a general change affecting all pertinent positions of articulation, all changing in the same way.

While this may be very neat, tidy, and quite interesting, we ought to realize that we are face-to-face with a tremendous problem: Which of the groups is the most conservative? Or more precisely, between Germanic and the other Indo-

Table 1-4. Indo-European and Germanic
Consonant Correspondences

<u>Indo-European</u>	<u>Germanic</u>	<u>I.-E.</u>	<u>Ger.</u>	<u>I.-E.</u>	<u>Ger.</u>
bh	b	b	p	p	f
dh	d	d	t	t	θ
gh	g	g	k	k	x

European languages, which is more indicative of the earliest consonant system--the one in the protolanguage? Of course, to provide a structured method of showing the sound correspondences between the two, we need only pick one arbitrarily and derive Germanic from Indo-European or Indo-European from Germanic by way of the sound shift described in the laws. Certainly, either way would serve to describe, but description is far from explanation. To explain the shift, we must know the direction in which it proceeded.

Determining the direction in which the shift progressed is of crucial importance for two reasons. First of all, we could more accurately describe and explain the relationships among the various language groups. This would give us knowledge of how such changes take place, and this knowledge could then be transferred to other linguistic phenomena, thus increasing our understanding of the way languages are structured and how they change in general.

The second reason for determining the true direction of the shift is not only linguistic, but also anthropological or historical. We should recall that the initial establishments, divisions, and spreadings of the Indo-European culture and its subcultures took place well before recorded history. While physical evidence at archaeological sites gives us significant information, much of our evidence is still linguistic and awaits an analysis reliable enough to corroborate physical evidence and to support anthropologists in their search for more physical evidence in certain places from certain time periods. Whether we determine the shift to have taken place in one direction or in the other direction

is going to have a great impact upon the study of the prehistory of the Indo-European cultures. (This point is addressed in more detail in section 5.3.)

1.3 CRITERIA FOR SOUND LAWS

We cannot afford arbitrariness in the establishment of sound laws. Rather, we must base them upon the most logical and reliable criteria we can come up with. After all, the way we write up these sound laws will determine the logical-tree relationships (the *Stammbaum*) of the languages and will serve as a statement for the manner in which the Indo-Europeans expanded and divided in prehistory--how they came to be where they are now. The way we write them up will also help guide us toward important insights into language change.

The criteria for writing sound laws, for determining the chronology and manner of change, are best illustrated by the various methods derived from them. These methods are divided into three main types: areal, typological, and phonetic. Of course, there are many other considerations, including such crucial linguistic matters as grammatical forms and such equally crucial nonlinguistic matters as physical evidence, but (as mentioned before) these are beyond the scope of the present work; and it is one of the basic arguments of this work that a sound-related methodology more adequate than the one traditionally used is sufficient to reverse the traditional view of the sound shift that accounts for the dif-

ferences between Germanic and non-Germanic Indo-European language groups.

It is not insignificant that all of these methods have, at least in their more rigorous forms, developed after the pioneering comparative work of the last century. Just how the original Indo-Europeanists arrived at their conclusions is a matter treated in Chapter 2.

1.3.a Areal Linguistics and Bàrtoli's Norms

In areal linguistics, especially as developed in the 1920s by Matteo Bàrtoli, we take into consideration the various languages, how many there are, and where they are distributed geographically¹⁹ This is more than a simple comparison of raw numbers of forms--certainly, if numbers were all that mattered, then the Germanic group would clearly be in the minority, for only the Germanic languages (and Armenian, see section 5.3) share the more fortis consonants. Rather, areal linguistics is guided by four principles, or "norms," as originally posited by Bàrtoli. To understand these norms, let us consider an example: the map in figure 1-4 showing the distribution of dialects in a hypothetical language family.

The first norm is that of the isolated area, and is exemplified on the map by the island (area number 1). According to this principle, if an area is isolated, as we would find on an island, in the mountains, or across some other natural barrier, then the language or dialect spoken there should be more conservative, maintaining something closer to the older forms. Isolation inhibits contact with peoples

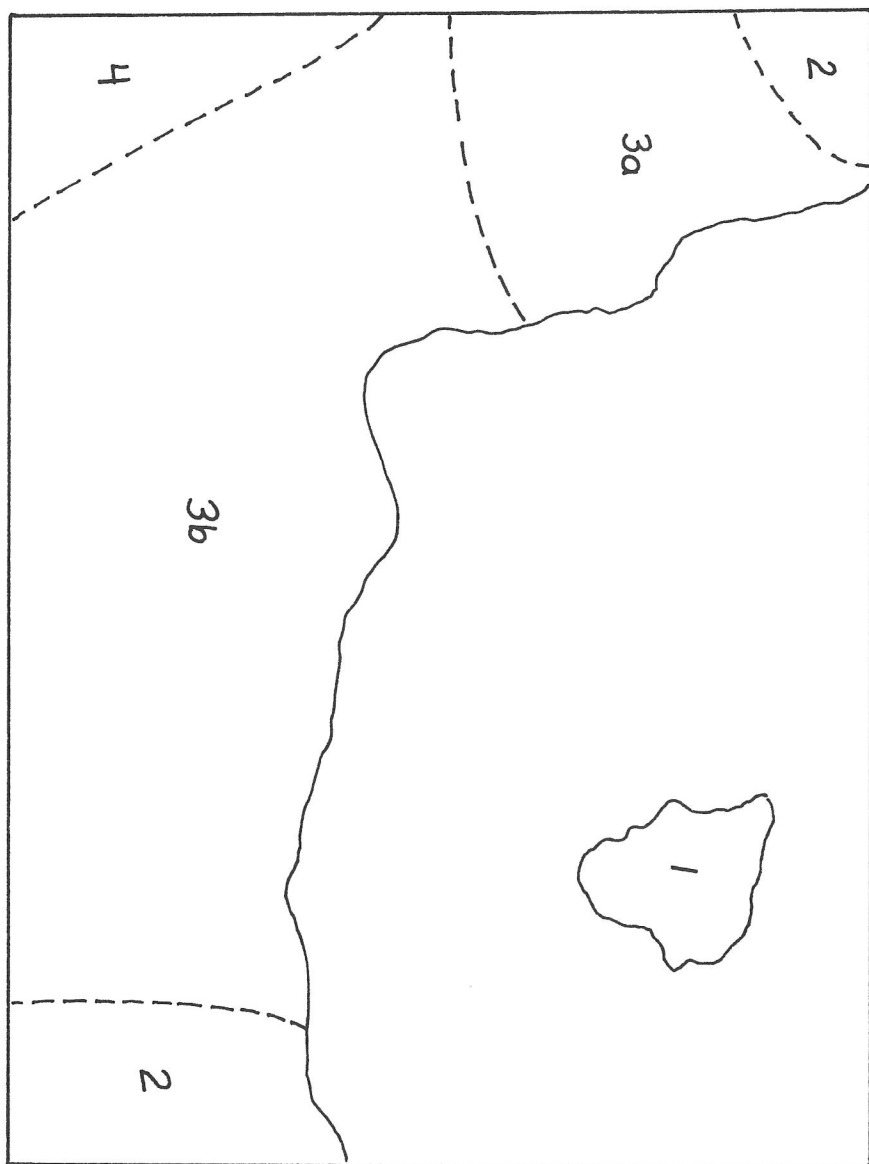


Fig. 1-4. Distribution of dialects
in a hypothetical language family

speaking other languages or dialects and thus cuts a population off from potential sources of change. Hence, Gaelic most successfully survives in the most mountainous, least accessible regions in northern Scotland, where there is relatively little contact with English.

Similar to this norm is the second, the norm of the lateral area, exemplified by areas number 2 on the map. If in a language or language family we find that two widely separated areas (areas on the periphery of the mainstream dialects or languages) consistently share common traits that differ from the bulk in the middle, then these lateral (peripheral) areas maintain the more conservative forms. Again, this is quite reasonable: these areas would in effect be isolated from the changes taking place in the central area.

For example, Spanish and Rumanian share many words that the other, more central Italic languages do not have.²⁰ As there was historically little contact between Spain and Rumania, we can rule out borrowing. The only explanation (and this is supported by the diversification of the Italic languages having occurred in recorded history) lies in the fact that these two areas were on the periphery of the Italic area. When a new word supplanted an old in Italy, the new usage would radiate out through Italy to Sicily and France, but it would often not go so far as Spain and Rumania. Thus, where Spanish and Rumanian agree with one another and differ with the other Italic languages, we can rather safely assume that the former two preserve the original.

I emphasize that in the norm of the lateral area (which

will prove extremely important in section 5.1), the two areas must agree. If, for example, only Spanish or only Rumanian has a particular form that differs from the rest, we could consider that the odd form preserves the original by virtue of being isolated by distance. On the other hand, we could just as easily consider that the odd form represents a borrowing from an adjacent language that does not border on the others, or that it represents an invention. Agreement, however, supplies us with the crucial corroboration.

The third norm is that of the principal area and is quite a bit more problematical. In the large area between 2, 4, and the sea on the map, let us say that two dialects have arisen, dialect 3a and dialect 3b. As there is no solid principle (such as the first or second norm) to determine which dialect is the more conservative, then we assume that it is the dialect occupying the greater (principal) area—in this case, 3a. This appeal to raw numbers is extremely tenuous and is invoked only when all other factors are equal; that is, we must restrict it to those cases in which we find neither isolated nor peripheral areas.

The danger in using the norm of the principal area can be seen in American English, in which the weak or velar [r] after a vowel is found only along the eastern seaboard, the rest of the country using the strong or retroflex [ɹ]. Indeed, writers often spell such words as sir spoken by Easterners as suh (at least for those in the Southeast) to reflect the fact that most speakers pronounce the retroflex [ɹ] and that this other sound is spoken only by a minority. As the eastern seaboard is not isolated and does not have corroboration

from, for example, the West Coast, we may wish to say that its practice is less conservative due to its limited area. As we know from history, however, the English colonization of North America proceeded from east to west and in this case Easterners retained the original pronunciation. Thus, this norm would mislead us, and it must therefore be used only with great caution.

Finally, there is the fourth norm--the norm of the later area. Let us say that at one time our hypothetical area was invaded from the sea and that the invaders imposed their language. Area 4, however, held out against the invasion for several generations, but it ultimately succumbed as well. The norm of the later area would hold that in the aboriginal language, area 4 maintains the most conservative forms. This, too, is based upon reason, for the other areas would in effect be put into contact with a language that would provide material for borrowing and they would be subject to this borrowing for a longer period of time--the longer the period of time in which borrowing occurs, the more forms borrowed.²¹ Thus, for example, North English is even today more Anglo-Saxon in its vocabulary than is the rest of English, for it was affected last by the Norman-French-speaking invaders. The same is true for North Welsh, which held out the longest against the Anglo-Norman invaders.

In the primary norms (that is, in the first, second, and fourth--the third used only when the others cannot be used), we see a single all-pervasive principle taking shape: The more isolated a language or dialect from external influences, the more conservative it tends to be. A great deal of the

change that normally takes place in language is caused by contact with speakers of other languages or dialects. This rather obvious (but no less profound) observation of change can be seen perhaps more clearly by comparing it to changes in dress. Left to themselves, cultures change their dress rather slowly, as can be seen in the surviving "national costumes" in Europe or the length of time the toga was worn in ancient Rome. Once contact is made with external dress, however, the change tends to be much more rapid, as seen in the adoption of English dress around the world (even in climates incompatible with it).

In dealing with areal norms, we ought to bear in mind the single overriding principle that drastic linguistic change is precipitated by close linguistic contact. In determining which language or which dialect is the more conservative, then, we must take into account the amount of contact the corresponding cultures have had with other languages or dialects. The primary areal norms of Bàrtoli provide us with a logical basis from which to work, but we must also examine each case individually, adding whatever pertinent nonlinguistic evidence we may have (as in the Italic example in the norm of the lateral area) as well as taking into consideration the peculiarities of the particular case under study.

1.3.b Language Typology

The second method of determining sound laws is through something that is today most generally known as language typology, although it is also known as language universals

and, especially in matters of historical change, seriation.²² This method was developed in the first half of the twentieth century by European linguists associated with the Prague School. Perhaps the single most important figure in this development has been Roman Jakobson, who treated the method as implicational markedness, a term that most precisely describes the aspect of this method that is most applicable in the determination of sound laws.²³

In general, though, typology is what the name suggests. Languages are divided into particular types depending upon what elements of structure they use and how they use them. For example, Latin incorporates a great deal of grammatical information in a word. Thus the word amāverō carries the information 'love' in the base am, perfectivity in the āv, futurity in the er, and 'I' in the ending ō. In English, on the other hand, we must segregate all of these bits of information into the separate words 'I shall have loved'. We can therefore speak of Latin as belonging to one type of language (synthetic) and English as belonging to another type (analytic).²⁴

In dealing with sounds, we can also divide the languages of the world into various types by a host of criteria, such as the number and inventory of sounds, the patterns of interaction among sounds, the criteria for differentiating consonants, and the patterns of consonant clusters (what consonants are allowed to occur in sequence). For example, in the fortis-lenis scale that exemplifies the correspondence between the Germanic and the non-Germanic Indo-European languages, we find several typological criteria. Adhering to

the main issue of language change, we can point out that this type of system maintains change from one level to the next (lower or higher), whereas the system traditionally maintained by English allows change between the *susurratae* and the spirants, as we see in such internal English correspondences, or "alternations" as breathe and breath.²⁵

As mentioned above, the aspect of this method that is of greatest importance to us in the determination of a sound law is its implicational nature. This aspect is based upon a very strictly applied hypothetical (implicational) logic and is best comprehended by way of example.

Let us consider French, in which the feminine word for 'one, a' is une, pronounced with a clear, oral vowel followed by a nasal [yn], and the masculine form of the word is un, pronounced with a nasalized vowel (with air passing through the oral cavity and the nose as well) with no nasal consonant [œ̃]. If we did not know the history of French and if this language had no writing system with its telltale n in un, we could determine only that French had two different types of vowels (nasalized and nonnasalized). An examination of more French words, however, would reveal that there are many instances in which the nasal consonant in one word corresponds to a nasalized vowel and no nasal consonant in another, closely related word or in another form of the first word. Still, though, there are many other words which do not have such correspondences.

At this point in our French example, we would sift through other languages in which these nasalized vowels appear, and we would find suitable correspondences in all of

the languages of this type. We would find that if a language has nasalized vowels, it also has nonnasalized vowels and nasal consonants. While this may seem obvious on the surface, the implicational aspect of the statement is more profound. It means that if we find nasalized vowels in language X, then that language always has nonnasalized vowels and nasal consonants as well; but if we find no nonnasalized vowels and nasal consonants in language X, then that language cannot have nasalized vowels. This establishes a priority among these sounds, such that nonnasalized vowels and nasal consonants are more common than nasalized vowels. Furthermore, the former must exist before the latter may.²⁶

The last statement supplies us with the means of applying typology (implicational markedness) to historical change and thence to sound laws. If one class of sounds must exist before another class may exist, then change may take place from the former to the latter—from nonnasalized vowels and consonants, on the one hand, to nasalized vowels, on the other. Moreover, examination of forms in change among the various languages we examine supplies us with the needed bit of historical information (which we actually do have in the development of French from Latin) to enable us to state that nasalized vowels are historically derived from nonnasalized vowels and nasal consonants.

Such a statement can be held as universal. That is, the pattern has been observed to be logically sound in all languages of this type, so it must therefore be applicable to any new language of this type that we may come across. Thus, where we find the nasalized vowel in an unwritten

language, the history of which we do not know, we can assume that at some point in that history the nasalized vowel was a combination of nonnasalized vowel and nasal consonant.

At the heart of language typology is the conclusion (based upon countless observations) that language operates in a system.²⁷ It is this system that supplies us with such logical implications as the one involving the nasalized vowel. It should be readily apparent that such a method, based upon the types of systems that languages enter into and also based upon strict rules of logic, is an extremely powerful device in discovering language change and in determining the sound laws through which some of these changes take place.

On the other hand, typology used exclusively by itself has some grave weaknesses. There are a great many types of languages and potential types of languages. The classification of two languages as a single type on the basis of one characteristic may overlook a possibly more important characteristic, which might separate them into different types. Moreover, the characteristic upon which the typology is based may not be readily apparent from the data of alternations and correspondences.

This uncertainty of typology taken by itself is especially dangerous in the very area we are investigating. The precise nature of consonant relationships in the fortis-lenis scale is open to much interpretation. The difference between two degrees in the scale may lie in muscular tension (as in French or Spanish), in aspiration (as in Welsh or Swabian), in

murmur (as in Sindhi), or in yet some other characteristic. Precisely what this phonetic characteristic is will be of extreme importance in classifying languages, but it is not readily apparent from typology alone (compare section 5.2).

Language typology in historical linguistics, however, can also be an extremely strong and reliable method when taken in conjunction with the phonetic method. Indeed, the strongest use of typology is first in supplying possibilities for phonetic investigation and then in corroborating phonetically based classifications. Of course, between the two stages, we should expect a great deal of refinement in the particular typological implications.

1.3.c Phonetics

The phonetic method of determining sound laws is perhaps the most reliable and is the one upon which this analysis is most directly based.²⁸ While sounds do change within systems of phonology, we must always be aware that these systems and the changes within them are themselves based upon the precise phonetic characteristics of the sounds that enter into them. Thus, sounds change in accordance with their own characteristics--particular characteristics are necessary for particular types of change to occur; if the particular characteristic is not present, the type of change based upon this characteristic cannot take place.

To see how important a role is played by phonetic detail, let us consider the example of New High German. Consonants in this standard language are organized into their

system in accordance with the phonetic characteristic or "feature" voicing, the vibration of the vocal cords heard and felt in the production of [v] (voiced) as opposed to the lack of vibration in [f] (voiceless or unvoiced).²⁹ Within the system, this opposition is seen in the phenomenon of word-final devoicing. When a [d] is realized in any position other than the end of the word, it is realized with its normal voicing; but when it is realized at the end, it loses this voicing. For example, we find the dative form Lande [landə] of the word Land [lant] 'land'. This affects not only the stops, but also the fricatives; therefore wherever s appears at the beginning of a word (or syllable), it is pronounced as the voiced [z] (as in so [zo:] 'so'), but at the end it is pronounced as the voiceless [s] (as in was [va:s] 'what').

The alternation in New High German reveals a significant systematic phenomenon called word-final neutralization. In German, the system is based upon voicing, and at the end of the word voicing is suppressed (neutralized). In the same word-final neutralization in Welsh, in which the consonant system is based upon the phonetic characteristic aspiration, word-final neutralization leads to what might appear to be the opposite effect. For example, we find the superlative form tlotach [tlotax] of the adjective tlawd [tlaud] 'poor', in which the loss of aspiration in word-final position has led to the realization of voicing.³⁰ Thus, while the system calls for neutralization in word-final position, the precise phonetic make-up of the sounds within the system determines just how this is to be realized--as a loss of voicing in German (which in fact usually leads to the

realization of aspiration) or as a loss of aspiration in Welsh (which usually leads to the realization of voice).

The crucial point here is that the precise phonetic characteristic or feature (be it voicing, aspiration, or something else entirely) that differentiates one sound from another is the primary building block of the phonological system. If the system is based upon one feature, it will alternate and change in one way; and if it is based upon another feature, it will alternate and change in another way that may even appear to be the opposite of the first (see section 2.5.a).³¹

Given the knowledge of the specific feature forming the basis of the alternation or change, we can predict the direction of the alternation or change. For example, Welsh uses a system of aspirate tension along the fortis-lenis scale, just like the one described previously in the Indo-European data, and it undergoes word-final weakening, or lenition, along this scale. Thus, when the name David was borrowed from Latin, it quite predictably came to be pronounced [davi~~d~~], with the next weaker member along the fortis-lenis scale in word-final position--a change from media to susurrata. Eventually, even the susurrata weakened to the next member of the scale--zero--to yield the pronunciation [davi] (and the spelling Davy, whence Davis/Davies).

On the other hand, given that this particular system in Welsh is based upon sounds making use of aspirate tension along the fortis-lenis scale, we would not expect to find strengthening, or provection, in neutralization. The phenomenon in German would be completely out of place in Welsh.

When such strengthening takes place, it does so only because of a particular condition that would cause strengthening--the doubling of consonants, heightened stress, or the addition of aspiration (as aspiration is the feature that identifies the various degrees along the scale). For instance, the Latin word litteras 'letter' with its double consonant was borrowed and strengthened (provetected) in Welsh to llythyr [l̥eθir]. (These matters are dealt with in more detail in section 4.1.b.)

The strength of the phonetic method in determining sound laws, then, lies in its ability to assess the degree of plausibility in a proposed change from one sound to another or in the general direction of a sound shift. It is the phonetic detail that ultimately allows or disallows a change, at least as long as language is spoken and is perceived through the same medium. Thus, it is the phonetic detail that leads us to determine whether a proposed change is probable or improbable, necessary or impossible.

Of course, the degree to which these determinations are reliable depends entirely upon the care taken in analysis. For example, we can say that word-final neutralization in an aspirate-tension language is probable (at least to some degree), but where it does occur, the realization of the next weaker member of the fortis-lenis scale is not only probable, but even necessary. While this set of conditions may very well have the appearance of the typological universals described above, it is derived from a completely different source--the precise phonetic detail of speech and how it may be realized within the constraints of speech.³²

For example, the *susurratae* were originally believed to be aspirated mediae. For typological reasons, Roman Jakobson and others doubted that this could be the case, as the original system would thus have had no aspiratae, and aspirated mediae occur only if aspiratae also occur.³³ A closer examination of the phonetic possibilities, however, would have disallowed such an occurrence in the first place. Phonetically, aspiration strong enough to be perceived as the puff of breath after a consonant consists of high-level acoustic energy that necessarily suppresses the low-level acoustic energy of voicing, a distinguishing feature of the mediae. Moreover, the amount of air in this degree of aspiration rushing through the vocal cords would necessarily prohibit the vocal cords from producing the voicing. Where aspirated mediae are said to occur, we find that these sounds are in reality murmured (breathy--in effect moaned).³⁴

In such examples, we can most clearly see the inherent superiority of phonetic evidence over typological. While typological evidence is based upon precedents and can thus determine no more than the probability or improbability of a change, phonetic evidence can at least sometimes determine the necessity or impossibility of a change. On the other hand, when we are dealing with languages that are no longer spoken (as in our investigation of the Indo-European proto-language), both the phonetic evidence and the typological evidence are ultimately based upon certain probabilities that collectively indicate whether or not the language did indeed maintain such systems. In such a gray area, it is quite im-

portant to have both types of evidence in as close an agreement as possible.

Where the phonetic and the typological evidence both indicate a particular phonetic characteristic as the substance of alternations or changes, then we can confidently assign "markedness" criteria³⁵ to the investigation of the prehistoric language. The concept of markedness in the study of phonology has to do with the choice of one particular phonetic feature over another related feature as the feature of phonological pertinence--as the feature upon which changes and alternations are based--and the consequences of this choice.

For example, we saw above that at the end of a word New High German neutralizes voice (which may well be realized in heightened aspiration) and that in the very same environment Welsh neutralizes aspiration (which may well result in voice). Thus, the German [d] is realized as [t] ([t^h]) in the word Land 'land', while the Welsh [t^h] is realized as [d] ([t⁻]) in the word tlawd 'poor'. Because of such alternations, we can say that the German system is "marked" for voice, and the Welsh for aspiration. Such a statement, then, serves to identify the phonetic feature of phonological pertinence--the one that is used in the working of the sound system.

To say that the marked-feature system is of phonological pertinence, though, is to say a bit more than it is the basis of some mechanistic system of relationships. Indeed, the marked system or opposition (as voice is opposed to voicelessness, aspiration is opposed to nonaspiration) is what

the speaker must utter and the listener must comprehend for communication to be reliably effected. This is to say that the German listens for the absence of voice to recognize the end of a word in connected speech and that the Welshman listens for the absence of aspiration. Of course, the aspiration in the German example or the voice in the Welsh can be valuable in cases where hearing may be difficult, but even these secondary clues only serve to inform the listener that the marked feature has been affected.

Within the feature system, moreover, we can further speak of markedness. In a marked-feature opposition, the presence of the feature is considered marked and its absence is considered unmarked. Thus, in word-final neutralization, it is the unmarked feature or member of an opposition that is realized--the voiceless or the unaspirated.³⁶ It is this aspect of markedness that most directly affects the analysis of the Indo-European sound shift.

CHAPTER 2

THE TRADITIONAL SOUND LAWS

In the determination of the relationships among the various Indo-European languages and language groups, the sound correspondence and sound law have played a prominent role. The sound law can, at least in principle and when used with caution, show degrees of relatedness and family groupings among languages if languages are indeed related--if enough cognate words can be found to enable the analyst to find regular correspondences in the first place.

In fact, the principles and practices outlined in Chapter 1 have been applied in a long tradition of Indo-European linguistic investigation. As we shall see in this chapter, however, this tradition by no means started abruptly with some concerted effort to solve an obvious riddle of language relationships. Rather, the concept of the sound law was arrived at slowly, over centuries of observations by scholars not necessarily interested in the Indo-European languages *per se*.

Nor were the principles of the sound law applied flawlessly once organized research into Indo-European began in the last century. While it would be grossly wrong to say

that such researchers as Friedrich von Schlegel, Jacob Grimm, Franz Bopp, and Karl Verner were anything short of brilliant linguists and astute phoneticians in their time, as is often (if not usually) the case, their observations missed the mark in some key areas, for they lacked the insights to be provided years later by linguists working from these researchers' own contributions. The scientist is much like a relay runner who may boast of his own success in moving the baton down the track but who ought never to forget that he could not have moved it an inch had it not been passed to him by someone else.¹

2.1 DEVELOPMENT OF THE SOUND CORRESPONDENCE

While sound correspondences may appear to be rather obvious and natural to us (now that we have examined just what they are), early scholars generally did not even notice them. Indeed, it would be rather unfair for us to expect them to have recognized these tokens of relationship among languages at a time when people did not believe that there was any relationship among languages. If regular sound correspondences existed between, let us say, Latin and Greek, then that was simply the way it was.

The painfully slow development of the concept of the sound correspondence and through it of the sound law itself can be traced through the observations of three Welsh scholars--Giraldus Cambrensis, Gruffydd Robert, and Edward Lhuyd. As we review these observations, though, we should

bear in mind the time period over which this seemingly "obvious" development was taking place. Giraldus Cambrensis wrote Descriptio Kambriae in about 1207, Gruffydd Robert published his Welsh grammar in 1567, and Edward Lhuyd published Archaeologia Britannica in 1707.

2.1.a Giraldus Cambrensis and the Middle Ages

In the early thirteenth century, Giraldus Cambrensis, or Girald of Wales, was traveling through Wales in order to determine how best to bring his homeland within the bounds of the Roman Catholic Church. A well-educated cleric, he knew Latin and Greek as well as Welsh, which gave him a particularly good basis for sound comparison.² As can be seen in the purpose of his travels, however, his one overriding concern was with the Church, and his observation of language in Descriptio Kambriae could thus be made only within the confines of Church doctrine.³

. . . salt is called ἅλ in Greek and Halen in British, for that language, from the length of time which the Britons (then called Trojans, and afterwards Britons, from Brito, their leader) remained in Greece after the destruction of Troy, became, in many instances, similar to the Greek.

It is remarkable that so many languages should correspond in one word, ἅλ in Greek, Halen in British, and Halgein in the Irish tongue, the g being inserted; Sal in Latin, because, as Priscian says, "the s is placed in some words instead of an aspirate," as ἅλς in Greek is called Sal in Latin, ἑμῖ --semi--ἑπτα--septem--Sel in French--the a changing to e--Salt in English, by the addition of t to the Latin; Sout, in the Teutonic language: there are

therefore seven or eight languages agreeing in this one word. If a scrupulous inquirer should ask my opinion of the relation here inserted, I answer with Augustin, "that the divine miracles are to be admired, not discussed." Nor do I, by denial, place bounds to the divine power, nor, by assent, insolently extend what cannot be extended. But I always call to mind the saying of St. Jerome; "You will find," says he, "many things incredible and improbable, which nevertheless are true; for nature cannot in any respect prevail against the lord of nature." These things, therefore, and similar contingencies, I should place, according to the opinion of Augustine, among those particulars which are neither to be affirmed, nor too positively denied.⁴

Curiously enough, Giraldus stumbled upon one of the very few correspondences that placed Welsh closer to Greek. Quite by coincidence, both language groups involved underwent an aspiration of [s], changing [s] to [h]. As can be seen in the comparison of numbers in the first chapter, however, the Celtic aspiration of [s] was far more limited than was the Greek.

This observation was not at all accidental. In the medieval Welsh tradition that we find in the Ynys Prydein (an epic giving the supposed roots of the Welsh people), the Welsh viewed themselves as descendants of Brutus (Giraldus's Brito), the son of Aeneas, who, according to Homer's Illiad, was forced to flee from Troy after the fall of that city. Any bit of evidence, then, that would serve to show that the Welsh and the Greeks were in some way related would have been of great ethnic value to Giraldus's contemporaries. Cloaked in his pious statement on the mystery of God's creation, he was making what to a medieval Welshman

would have been a blatantly obvious reference to the relatedness between Welsh and Greek.⁵

It would certainly be improper to say that what Giraldus Cambrensis was engaged in was comparative linguistics, for the correspondence he found was devoid of any scientific rigor. Nonetheless, he was in this very isolated case able to identify a sound correspondence for the purpose of demonstrating language relationships, and this fact should not be taken lightly. It was an extremely primitive attempt based upon premises that would later be seen as spurious; but given the context of the early thirteenth century, we should be rather impressed by this effort to establish familial (or genetic) connections among languages on the basis of sound correspondence.

Even more importantly though, Giraldus extended his observation to several other languages. This is quite significant, for while Priscian (cited by Giraldus) could see a correspondence between Latin and Greek, the Romans considered themselves heirs to the Greek culture to the point that the Latin grammarian viewed the difference more as one of linguistic change. Giraldus, on the other hand, could have viewed the languages mentioned only as completely unconnected tongues. Thus, the scholar is genuinely baffled in this case.

In the next generation of language scholars, at least some of this bafflement was resolved, as Roger Bacon determined that Aeolic, Attic, Doric, and Ionic were dialects of Greek--thus explaining several sound correspondences. In the following generation, Dante observed the same relationship

between the Italic languages and Latin. However, the relationship among the various Italic languages and Latin was perceived at this time to be quite different from the one we know today. It was believed that Latin was a standard manufactured by the ancients to enable the speakers of the various Italic languages to communicate with one another. Of course, such a view should not really be surprising in the later Middle Ages, as Latin was then being used as just such a *lingua franca* throughout Europe.

2.1.b Gruffydd Robert and the Renaissance

The late medieval view of language relationships far from precluded important discoveries in the Renaissance. In the early sixteenth century, J. C. Scaliger and P. Bembo realized that the sounds relating Latin to the various Italic languages were themselves relatable through rule. For example, in spite of the various pronunciations of c, Scaliger determined that the original sound in Latin must have been pronounced [k]. Of course, the concept of the "original sound in Latin," while it did not quite admit to the genetic relationship, certainly opened the way for its hypothesis.

The discovery of the genetic relationship among the various Italic languages was made in the middle of that century by C. Gesner, who also believed, however, that Latin, the parent of the Italic languages, was itself a descendant from Greek and ultimately from Hebrew--a misconception that would persist among many scholars for the next two centuries (see also section 5.3.a). Working more partic-

ularly with French, E. Pasquier made the discovery (remarkable for his time) not only that French was a derivative of Latin, but that it contained elements from Germanic and Gaulish as well as borrowings from Italian and Spanish.

It is at this point that we find the contribution of Gruffydd Robert. In the 1560s, Robert was studying in Italy where important breakthroughs concerning the relationships among the Italic languages were being made. Insofar as the relationships among the various language groups were concerned, however, very little was known. What was known was that languages did borrow words from one another (and sometimes quite frequently), as we see in the discovery by Pasquier that French contained elements of other, non-Italic languages.

In this context, Robert's contribution is rather more exemplary than innovative, but it is quite remarkable for its number and precision of correspondences between Welsh and Latin. In a discussion in his Dosparth Byrr (or, as it is more usually called, his Gramadeg Cymraeg--Welsh Grammar),⁶ he noted that when the Welsh had needed a new word, they had usually borrowed it from Latin, seldom from Greek, and he proceeded to give several pages of cognates illustrating the sound correspondences. The first few of Robert's correspondences have been organized into table 2-1, which is a bit easier to comprehend than the organization of Robert's original, which went on to give many more correspondences than this sample.

Because he was dealing with sound correspondences in which the direction and nature of the sound change was

Table 2-1. Sample of Gruffydd Robert's Correspondences

<u>Latin</u>	<u>Welsh</u>	<u>English</u>
v - gw		
vīnum	gwin	wine
virī	gwŷr	men
l - ll		
līber	llyfr	book
lapidāre	llabyddio	to stone
b - f		
līber	llyfr	book
Iacob	Iagof	Jacob
m - f		
firmāmentum	ffurfafen	firmament
columna	colofn	column
p - b, d - dd		
cupidus	cybydd	miser
t - d		
vitrum	gwydr	glass
c - g		
consecrāre	cysegru	to consecrate
g - 0		
Aegiptus	Eipht	Egypt
vāgīna	gwain	sheath

assumed, Gruffydd Robert in reality was stating sound laws.⁷ For example, he wrote "Latin l at the beginning of a word changes into ll, liber llyfr ['book']; latīnum lladin ['Latin']; labōrāre, llafurio ['to toil']; lapidāre, llabyddio ['to stone']."⁸ In the schematic representation of historical linguistics, this would be initial Latin l > Welsh ll.

Without the general knowledge of Indo-European language relationships, however, neither Robert nor his contemporaries could realize that some of the sound correspondences were not the result of borrowing, but were reflexes (descendants) of words from a common ancestor. For example, Robert noted that initial Latin v corresponded to Welsh gw in such borrowings as vīnum and gwin 'wine'. On the other hand, his correspondence between Latin virī and Welsh gwŷr 'men' was not the result of borrowing, but rather reflected the primitive Indo-European ancestor, which he failed to realize simply because the entire thrust of comparative linguistic study to this time had been concerned with relationships within particular language groups. The correspondences between Latin and Welsh, between two distinct groups, could have been analyzed only as coming from borrowing.

Indeed, this remained the case throughout the sixteenth and even the seventeenth centuries. While tremendous amounts of data were being recorded and collated to show the relationships among members of a group, the Indo-European relationships were as yet undiscovered. For instance, in his essay Diatriba de europaeorum linguis, appearing in the early seventeenth century, J. J. Scaliger determined eleven

groups of languages ("mother" languages), including four major and seven minor groups. Organized by their respective words for 'God', these included Slavic (the Boge languages), Germanic (the Godt languages), Italic (the Deus languages), and Hellenic (the Theos languages) as the four major groups; and Albanian, Tartar, Hungarian, Finnish, Gaelic, British, and Basque as the minor groups.

The work of J. J. Scaliger was profound both in its insights and in its impact on the development of linguistics. His groupings were in fact accurate and guided research for generations to come. For example, his classification of Gaelic and British (Brythonic) as two distinct groups may have been revised a century later by Edward Lhuyd; but without this initial taxonomy, which lent itself so readily to revision, it is not unreasonable to suggest that Lhuyd might not have developed his contributions, as he was after all primarily interested in the Celtic languages (as shown in section 2.1.c).

While Scaliger's taxonomy clearly defined language groups, it did not go so far as to include the words that might have shown that some groups were related more to one another than to other groups. Perhaps the extensive evidence of borrowing prompted him to be more conservative than necessary in his groupings. In any case, the Indo-European groups (Slavic, Germanic, Italic, Hellenic, Albanian, Gaelic, and British) remained separate entities in the view of linguists--as did the Finno-Ugric groups (Hungarian and Finnish).

2.1.c Edward Lhuys and the Pre-Indo-Europeanists

J. J. Scaliger's classification of language groups was accomplished by comparing words, as was the practice earlier and later. Simple word comparison, however, could be extremely unreliable. Not only was there the problem of borrowings that might mislead the researcher, but the comparisons themselves were too often based upon holistic impressions. The method lacked the precision needed to determine potentially complex relationships.

This necessary precision lay in the analysis of word elements--their sounds and grammatical forms. Moreover, both types of analysis gained significant impetus in the very early eighteenth century.

The worth of examining not whole words as such but the grammatical forms and inflections was amply demonstrated by J. Ludolf. Conducting research into the various Semitic languages, Ludolf found that Hebrew, Syriac, Arabic, and Ethiopic groups could be classified together as one language family on the basis of their common grammatical structure, a structure very much foreign to the Indo-European language groups. This discovery was impressive in that it led to the establishment of an entire language family, something hitherto impossible, as scholars lacked the common thread of grammatical forms that could be seen running through related languages.

Ludolf's discovery had even broader implications for the study of Indo-European. It provided a method of investiga-

tion that would prove to be the most important tool of modern comparative linguistics and that would lead to the determination that Sanskrit was related to Latin and Greek and thence to the other Indo-European languages. Furthermore, it once and for all demonstrated that Latin and Greek were not descended from Hebrew (a notion already under attack by G. W. Leibniz), for their grammatical structures were utterly different. This demonstration, while it did not remove the popular notion of Hebrew linguistic ancestry, did remove the requirement that Hebrew somehow fit into the analyses of serious linguists investigating Greek, Latin, and the other European languages.

Of even more importance to the matter directly at hand--the evolution of the traditional sound laws--is the development of a more rigorous examination of sound correspondences (though, of course, at this time and for some time to come these correspondences were in fact correspondences in letters). Although it rarely receives the recognition due it, the Archaeologia Britannica published in 1707 by Edward Lhuyd stands as a watershed work in sound (letter) correspondence as well as in Indo-European studies.⁹

As discussed previously, J. J. Scaliger had classified Gaelic (Irish and Scot) and British (Welsh and Breton) as two separate mother languages, or language groups. Lhuyd proceeded to show that these two groups were in reality subgroups of the greater Celtic family. To do this, he compiled extensive vocabularies and grammars (to show the grammatical, structural correspondences) of the various Celtic languages. As such, his work is noteworthy, for it combined the

rigors of traditional language-group studies with the latest innovations in grammatical investigation. In this respect, it was a splendid state-of-the-art study.

Lhuyd's Archaeologia Britannica, however, went much further than this. In his first chapter "Comparative Etymology," Lhuyd based his analysis of sound correspondences and of lexical and grammatical (structural) correspondences on a fixed set of principles derived from his own observations as well as from those of his forerunners. As such, his approach is a model of scientific linguistics in general and of phonology in particular. These principles he states as follows:

The Origin of Dialects which (as is before observ'd) become in time distinct Languages; happens

I. From the Alteration of the use of words, by applying them to signify different Notions from those already receiv'd.

II. From an Accidental Transposition of Letters or Syllables.

III. From an Addition or Subtraction of them; which is sometimes Casual, and sometimes Industrious, for Improvement.

IV. From using different Prepositions in Compounds, or different Terminations.

V. From a Change of Letters on account of Mispronunciation.

VI. From the use of Foreign Words, either Introduced by Conquest or borrow'd from those Nations with whom we have Trade and Commerce.¹⁰

In order to illustrate these principles, Lhuyd proceeded to list many examples, or "observations," going into greatest detail and number in the types of change that one finds in the sounds (letters) of related languages. Of great impor-

tance in the development of comparative linguistics is the organization and precision of his observations, which were stated as sound laws. For example, "Observation XII" is entitled "Labial Mutes Omitted"; it is divided into three parts according to position within the word--1. "Initial Labials Omitted," 2. "Middle Mutes Omitted," 3. "Lab. omitted in the Termination"; and the first part is further divided by sound (letter) affected--P., B., F., M.¹¹

Throughout his observations, Lhuyd compared the various Celtic languages with one another. For example, in the observation just cited, he compared "W. Pysk, A Fish; Ir. iasg," to demonstrate the regularity of the sound change noted in the title. In so doing, he established the relationship among the Gaelic and the Brythonic languages within the greater Celtic language group. While this is widely acknowledged as his significant contribution to linguistics, some other, more important implications lie hidden in his data.

First, Lhuyd stated his observations in the form of sound laws. This he did quite deliberately, as we can see in the introductory paragraph to his observations (directly following his principles):

All which, in regard there may be frequent occasions of having Recourse thereunto, I thought not amiss to Exemplify at large in the following Remarks, on the Alterations of that which we take to have been the First Language of this Island; and to Parallel those Examples, with the like Observations in Respect of the Ancient and Modern English, and some times other Languages.¹²

What we have here, then, is an early attempt to recon-

struct through sound laws the forms of words as they originally existed in the parent language, proto-Celtic (or Common Celtic, as it is more often called today). To be sure, this is a primitive attempt. There are no protoforms, but we could very well construct them from the combination of the sound laws given; the protoform appears suspiciously close to the Welsh in too many cases, but (as will be shown in this and subsequent chapters) the reconstructed forms in proto-Indo-European are rather too close to the classical languages, due also to the researchers' prejudices; there is a confusion between borrowed forms and forms that changed within the language group, but this was and to some extent still is a source of difficulty. In all, it is a remarkably respectable attempt.

Second, Lhuyd went further than Celtic in his observations. As he states in his introductory paragraph, he took examples of the various types of change from other languages as well. Notably he compared the very same sound laws as they appeared among the Celtic languages, among the Italic languages (Latin, French, Italian, and Spanish), among the Germanic languages (English, German, Flemish), and among the classical languages (Greek and Latin--as a curious sign of these times of transition, he still dealt with Latin as though it derived from Greek, though he would rarely mix the Italic group with the classical). In addition, he also drew in examples from Slavic and recognized such minor dialects in Italic as Cantabrian.

Thus, he was not simply observing changes among the Celtic languages. Rather, he was comparing these changes

with the same changes he observed in other language groups and making general observations on how sounds change in language. For instance, the loss of the initial labial consonant noted in the example above was described as the same process in Celtic as in Italic--"Lat. Ptisane, Fr. Tisane." In treating the type of change as applicable to different languages and language groups, Lhuyd was dealing with more general issues of linguistics, and he may be described as an early language typologist. Of course, his contribution in this area is primitive, and we must glean it from the combination of his observations; but in the context of the early eighteenth century, this contribution is of tremendous significance.

Perhaps the greatest contribution found in the Archaeologia Britannica is one of which few people are aware. Because the book's primary significance (or at least its reputation) lies in its determination of the Celtic language family and in its exhaustive treatment of the Celtic languages, it is rarely read by linguists with interests beyond Celtic. Moreover, because the introductory chapter is simply not as interesting to the Celtic scholar as is the wealth of information on Celtic languages found in the bulk of the book, understandably few Celtic linguists are that concerned with the "Comparative Etymology."

In quite a few of his observations, though, Lhuyd compares forms not only within the established language groups, but among them as well. This is perhaps nowhere as intriguing as in "Observation XX: Change Of The Palatal Letters K. [al. C. or Q.] G. x. [or Ch.] H." Here he made an explicit

observation demonstrating quite clearly not only that he was aware of a relationship among the various known Indo-European language groups, but also that Germanic was different in its consonants from the others. Indeed, this observation predates Grimm's Law by over a hundred years.

It is very observable, that a great many words, whereof K. C. or Q. is the Initial Letter in the Greek, Latin, Italian, Spanish, French, British, Irish, Sclavonian and some other languages, begin with H in the Teutonic; which when (besides the Termination peculiar to each Language) several other Alterations (as Transposition, Omission, Addition or change of other Letters) concur; so disguises words, that they appear utterly irreconcilable, till traced thro' several Languages. There are infinite Examples of this; but I shall instance only in these Few.

W. Kydhio, Engl. To Hide.

W. Koed, Wood; Belg. Hout. . . .

W. Korn, Germ. Engl. &c. Horn. . . .

Sclav. Kurba, A Whore; Pol & Bohem. Kurwa, Hung. Kurva; Swed. Hora Germ. Hur, †Engl. Hure, Dan. Hore, Belg. Hoere. . . .

Gr. & Lat. Cannabis, Ir. Kanap; Belg. Kenip, Fr. Chanvre, Germ. 'hanf. Engl. 'Hemp.

Lat. Qui, Engl. Hwa; Cujus, Huaes; Qud & quod, Hwat.

Ital. Casa, Germ. Hauss, Engl. House.¹³

As an early attempt to show the sound correspondences and indeed sound laws relating the various Indo-European languages with one another and here specifically with Germanic, this work does make several statements that have since been abandoned. Lhuyd included Hungarian with the Slavic languages on the strength of a word that is doubtless a borrowing. Nonetheless, he did manage to put together an

impressive array of Indo-European forms and to relate them specifically by sound correspondence; he even uncovered the importance of going back to the oldest form in the language in order to see more clearly these relationships (as we can surmise from his inclusion of Old English forms--on the use of the oldest form, see section 2.4.a).

Edward Lhuyd believed that the European consonants showed such strange correspondences as those noted because at one time they all underwent the type of alternations found in the Celtic "mutations," in which the initial consonant changes depending upon its grammatical environment (for example, tad 'father', ei dad 'his father', ei thad 'her father', fy nhad 'my father').¹⁴ While we now recognize that this hypothesis was quite wrong, we should not ignore the fact that this scholar did indeed find sound correspondences and state them as sound laws to incorporate all of the known Indo-European language groups into a single greater language family.

Thus, over a period of five centuries, we have gone from the notion that the sound correspondence is a divine mystery to the realization that it is something that can be studied scientifically. Moreover, we have also gone from the view that similarities among languages are merely there and that is all that can be said, to the modern view that these sound correspondences are expressible as sound laws and show family relationships among languages and language groups. At this point, then, we can proceed to see how this concept of the sound law, developed so painfully over half a millennium, was used by the early Indo-Europeanists to show

the position of Germanic within the overall Indo-European language family.

2.2 THE DISCOVERY OF INDO-EUROPEAN

By the end of the eighteenth century, as we have seen in the previous section, linguists possessed two crucial points of understanding. First, languages and language groups could be classified in accordance with their sound correspondences. These correspondences could be used to show genetic relationships among them in the sound law, according to which certain sounds (still letters) from an earlier stage changed to certain other sounds in a later stage, as languages developed dialects which in turn became other languages.

In addition to this theoretical point, there was also a practical point as well. The concept that the European languages were organized into groups that were in turn related within one great language family was well established in the literature. Whether or not many linguists indeed read extensively of this literature, the concept itself existed, and the scholarly community was prepared for the flurry of activity in historical and comparative Indo-European linguistics that ensued.

The stimulus for research into the Indo-European language relationships came from the discovery of the Indic, or Sanskrit, branch of the family. While some reports had reached Europe that the ancient language of the Indians

appeared to be quite similar to those of the Europeans, it was the report by Sir William Jones to the Royal Asiatic Society of Bengal in 1786 that is credited with starting the investigation that followed. In his report, Jones made the following, often-cited observation:

The Sanskrit language, whatever be its antiquity, is of a wonderful structure; more perfect than the Greek, more copious than the Latin, and more exquisitely refined than either; yet bearing to both of them a stronger affinity, both in the roots of verbs and in the forms of grammar, than could possibly have been produced by accident; so strong indeed, that no philologist could examine them all three, without believing them to have sprung from some common source, which, perhaps, no longer exists: there is similar reason, though not quite so forcible, for supposing that both the Gothic and the Celtic though blended with a very different idiom, had the same origin with Sanskrit; and the old Persian might be added to the same family, if this were the place for discussing any question concerning the antiquities of Persia.¹⁵

As noted above, others had also noticed the resemblance between Sanskrit and the classical languages of Europe. Jones, however, was the first actually to suggest the type of relationship that existed. If we try to view his observation schematically, we can visualize a tree structure, much as those introduced in Chapter 1. At the head of the family tree is the unknown common source, and sprouting from this source we can construct six branches: Sanskrit, Greek, Latin, Germanic (Gothic), Celtic, and Aryan (Persian). Given what had already been established regarding the various languages belonging to these groups, we could construct

further branches from these language groups--the Hellenic dialects from Greek, the Italic languages from Latin, and so forth.

This point marks the beginning of Indo-European linguistics as such. From this point on, linguists strove to determine evermore precisely the relationships among the various Indo-European language groups and their respective member languages. Following in the tradition of J. Ludolf, the new Indo-Europeanists concentrated upon the grammatical structures of the various related languages, isolating roots, endings, and affixes.

While the object of this present work concerns specifically the sound law, it is important to note several more general developments in the traditional Indo-European research, for these had a great effect upon linguists' perception of how the sound correspondences should be codified. In this light, the position of Sanskrit and the other classical languages (Greek and Latin) apropos of the rest of the Indo-European language family is of crucial importance.

In his pioneering work on Indo-European language relationships, Über die Sprache und Weisheit der Indier published in 1808, Friedrich von Schlegel¹⁶ not only agreed with the relationship noted by Jones among classical Sanskrit, Greek, and Latin, but he went so far as to set up a language family with Sanskrit as the ancestor of the others, and for that matter as the ancestor of all of the Indo-European language groups.

While such a position may appear to be an extreme conceptual leap to us today, given the outlooks of Schlegel's

time, it follows rather logically from three widely held beliefs. First of all, all that the early Indo-Europeanists had to work with was written language. Moreover, it was a long-held opinion (which survived well into this century) that written language was somehow more "legitimate" than spoken language. This opinion had been taken so far especially in the eighteenth century that educators doubted whether English even had a grammar and insisted on teaching grammar through Latin--a language existing only in its "pure" written form. It is altogether natural, then, that the antiquity of the Sanskrit writings should have had an effect. Sanskrit was assumed to be the oldest language because it had the oldest writings. (This point is further developed in section 2.4.a.)

The reason given by Schlegel himself for considering Sanskrit to be the oldest Indo-European language and thence the ancestor of them all lay in Sanskrit's rich morphology. The systems of inflectional endings in this newly discovered relative were even richer than those of Greek and Latin, which grammarians had long held as the ultimate expression of grammar. A logical analogy comes into play at this point. If the ancient European languages (Greek and Latin as well as Gothic and the other old dialects) maintained complex morphologies and the subsequent generations simplified them, then this even more complex morphology of Sanskrit should suggest that these ancient European languages be degenerate offspring of Sanskrit. Not only was this a reasonable assumption from the standpoint of all that had been discovered thus far in linguistic research, but it also supported

the general natural theory of entropy—that all things degenerate (see section 2.4.b).¹⁷

Finally, there was the matter of race. It was thought that the European races had originated around the Caucasus Mountains (hence the name Caucasian). With this eastern genesis, it was far more reasonable to suppose that the speakers of the Indo-European language developed their magnificent culture in the East, and then an offshoot of this culture migrated westward to Europe. Such a hypothesis was well supported by the theory of entropy, for it maintained that a developed culture degenerated as it moved west, just as the language degenerated between Sanskrit and the European classical languages (see section 2.4.c).

In 1816, Franz Bopp suggested a much less radical position for Sanskrit among the Indo-European languages in his Über das Conjugationssystem der Sanskritsprache in Vergleichung mit jenen der griechischen, lateinischen, persischen und germanischen Sprache.¹⁸

I do not believe that Greek, Latin and the other European languages are to be considered as derived from Sanskrit . . . I feel rather inclined to consider them altogether as subsequent variations of one original tongue, which Sanskrit has preserved more perfectly. . . . But while the language of the brahmins more frequently enables us to conjecture the primitive forms of Greek and Latin . . . the latter may not infrequently elucidate Sanskrit grammar.¹⁹

This return to the position of William Jones was made for linguistic reasons. Because Greek and Latin forms could more frequently be predicted from Sanskrit (than vice

versa), Sanskrit was seen as more conservative--the language closer to the original proto-Indo-European. Its position as the most conservative of the Indo-European languages, while it denied Sanskrit the status of the parent language, still maintained Sanskrit as the closest thing to the parent language. Moreover, the reasons noted above for suggesting that Sanskrit be the parent language (age of writings, elaborate morphology, racial theories) could still be well maintained for the conservative position of Sanskrit.

It is this notion of the conservativeness of Sanskrit (and the Indic subfamily in general) that has shaped the traditional sound laws. In the absence of any good reason to the contrary, it has generally been assumed that the phonology of Sanskrit maintains a more conservative sound system than those of the other Indo-European languages. Consequently, with the exception of the [ʃ] (as in Sanskrit śatām 'hundred') often in place of the [k] (as in Latin centum), the consonant subsystem of proto-Indo-European is still widely taken to be isomorphic with that of Sanskrit. (See section 5.1.c for an explanation of the satem change.)

2.3 THE FIRST GERMANIC SOUND SHIFT

By this point in history, the linguistic investigations into the relationship among the various Indo-European languages had become basically a German endeavor, with such famous German scholars as Schlegel, Bopp, Grimm, Verner, K. Brugmann, B. Delbrück, and many others at the forefront of

activity. It is not surprising, then, that a great deal of attention in the field was focused upon the position of the Germanic languages vis-à-vis the rest of the language groups.

2.3.a Rasmus Rask and the Sound Law

The final background to the development of the first Germanic sound shift was provided within this growing tradition of German and Germanic philology by the Dane Rasmus Rask. In "Undersøgelse om det gamle Nordiske eller Islandske Sprogs Oprindelse" (1818),²⁰ Rask set forth his evidence for considering the Germanic languages (particularly the Scandinavian) and the other languages of Europe as descendants of an original language (which he called Thracian). It should be noted, though, that at that time (much less in 1811, when his original essay was presented) he was as yet unaware of the relationship between Sanskrit and the other classical languages.

In addition to lexical, grammatical, and morphological similarities, Rask stressed the importance of examining the letter or sound correspondences among languages believed to be related. Indeed, he formulated the first explicit definition of a sound law:

When in such words one finds agreements between two languages, and that to such an extent that one can draw up rules for the transition of letters from one to the other, then there is an original relationship between these languages; especially when the similarities in the inflection of languages

and its formal organization correspond; e.g.

Gk phēmē in Latin to fama and holkos to sulcus
 Gk mētēr in Latin to mater and bolbos to bulbus
 Gk phēgos in Latin to fagus and amorgē to amurca
 Gk pēlos in Latin to palus and Aeol. olkhos to
vulgus

From this one sees that Gk e in Latin often becomes a, and o becomes u; by bringing together many words one would be able to draw up many transition rules. And since one finds such great agreement between Latin and Greek grammar, one can rightfully conclude that an original relationship exists between these languages, which is also sufficiently known and does not need to be demonstrated here again.²¹

For the formality of his definition and for the scientific rigor with which he applied it, Rasmus Rask is now considered the father of the sound law. It was upon his findings that the Indo-Europeanists built their laws and reconstructions. Indeed, we even find the data and presentation in his work for the first Germanic sound shift that followed.

2.3.b Grimm's Law

Working from this principle of the sound law, Jacob Grimm set about the task of determining precisely the sound relationship between the Germanic language group and the rest of Indo-European, including Sanskrit.²² Grimm discovered that Old High German derived from Germanic by way of a general sound shift among the labials, dentals, and velars; Germanic derived from Indo-European by way of the same sort of shift:²³

In the labial, lingual and guttural sounds, the Gothic (Saxon, Frisian, Northern) tenues correspond to the High German aspirates; the Gothic mediae to the High German tenues; and the Gothic aspirates to the High German mediae. The particulars may be expressed as follows:

Goth.	P.	B.	F.	T.	D.	.	K.	G.	.
OHG	F.	P.	B,(V)	Z.	T.	D.	CH.	K.	G.

A change has taken place by means of which each of these nine consonants in High German shifted similarly from its position. . . .

. . . For just as Old High German has sunk one step down from the Gothic in all three grades, Gothic itself had already deviated by one step from the Latin (Greek, Sanskrit). Gothic is related to Latin exactly as is Old High German to Gothic. The entire twofold sound shift, which has momentous consequences for the history of language and the rigor of etymology, can be so expressed in a table:

Gk	P.	B.	F.	T.	D.	TH.	K.	G.	CH.
Goth.	F.	P.	B.	TH.	T.	D.	-. K.	G.	
OHG	B,(V)	F.	P.	D.	Z.	T.	G.	CH.	K.

Grimm not only set up the system of correspondences between Germanic and the classical Indo-European languages, but he also formulated these in terms of sound laws. As it was developed not only by Grimm but also by his followers,²⁴ this first Germanic sound shift, or "Grimm's Law" (as it came to be known), held that the Germanic language subfamily derived from the rest of Indo-European by means of a general shift, which we can represent in table 2-2. When we compare this shift with the fortis-lenis scale as represented in figure 1-3 (and even more in table 1-4), it should be extremely obvious that the shift as formulated by

Table 2-2. Grimm's Law

<u>Indo-European</u>		<u>Germanic</u>		<u>I.E.</u>	<u>Ger.</u>		<u>I.E.</u>	<u>Ger.</u>	
bh	>	b		b	>	p	p	>	f
dh	>	d		d	>	t	t	>	θ
gh	>	g		g	>	k	k	>	x

Jacob Grimm proceeded up the scale from lenis to fortis--from *susurrata* to *media*, from *media* to *tenuis*, and from *tenuis* to *spirans*.

Grimm built upon the collective wisdom of his contemporaries (such as Schlegel and Rask) and of his predecessors in formulating his first Germanic sound shift. Several assumptions were incorporated into the shift--assumptions treated more particularly in the following section. Most importantly, he assumed that the classical languages were the more conservative of the Indo-European language family (if not the ancestors); consequently, Grimm's Law includes the basic principle that the shift operated in a direction from these classical languages to the more innovative Germanic. Sanskrit was the only language to maintain the *susurratae* as apparent "voiced aspirates" bh, dh, gh, therefore the Sanskrit language was now considered more than ever the epitome of conservativeness, at least insofar as these consonants were concerned.

Grimm's contribution to linguistics in general and to Indo-European in particular is monumental. Where others had seen correspondences and a whole collection of sound changes, Grimm saw a regular shift among sounds, which he quite perspicuously grouped together.²⁵ While it is easy for us today to criticize certain details of his analysis on the basis of information and insights not available to him in the nineteenth century, we must bear in mind that Jacob Grimm stood at the vanguard of his times, and without Grimm's Law we would not have progressed to the point that we have in historical and Indo-European linguistics--certainly

not to the point that we can now find flaws in that law.

2.3.c Verner's Law

Grimm recognized that the first Germanic sound shift was not really a firm law, but was a tendency with several exceptions. Insofar as the consonants of the fortis-lenis scale are concerned, the greatest exception (or really counterexample)²⁶ was isolated and described by Karl Verner. By the time Verner wrote his "Eine Ausnahme der ersten Lautverschiebung" in 1875,²⁷ it had long been recognized that there was a particularly major group of exceptions to Grimm's Law; namely, some intervocalic tenuis changed not to spirants but to mediae.

Examining the data and the arguments made earlier by other investigators, Verner found that "When the accent in Sanskrit rests on the root syllable, we have the voiceless fricative for the root final in Germanic; on the other hand, when the accent in Sanskrit falls on the ending, the Germanic forms show a voiced stop for the root final."²⁸ Thus, for example, Gothic brōþar 'brother' was seen to have undergone Grimm's Law, with the intervocalic spirans protected (made more fortis) from the tenuis found in Sanskrit bhrā́tar-. On the other hand, Gothic fadar 'father' could now be seen to have undergone "Verner's Law," with the intervocalic media lenited from the tenuis in Sanskrit pitár-. Grimm's Law (protection) applies intervocalically when the accent precedes the tenuis, and Verner's Law (lenition) applies intervocalically when the accent follows.

It should be noted that Verner's treatise was a brilliant piece of linguistic analysis. Not only did he search out patterns behind the exception, but he used phonetic sound and even physiology as the basis for his determinations; for example, he explained the shift from tenuis to media in terms of the vocal cords' relaxation due to lack of stress and thus their vibration with the characteristic voicing of the media. He also brought in related phenomena from other languages, such as the evidence from Old Icelandic poetry, in which the Gothic syllable division may well have been fad-ar (rather than the more modern fa-dar), thus placing the media in the less accented syllable.²⁹

It is also significant, though, that whereas Sanskrit was the only language faithfully maintaining this old accent system, the Sanskrit language became more tenaciously entrenched as the most conservative of the Indo-European languages, certainly insofar as the consonant system was concerned. When we add this aspect of the shift to the "voiced aspirates" above, we can see that if Bopp had weakened Schlegel's early statement that Sanskrit was the parent language by more correctly classifying it as a very conservative descendant of the original language, this distinction for the first Germanic sound shift was of little significance. With the exception of Sanskrit s for Indo-European palatal *k̑, the Sanskrit consonant subsystem was for all intents and purposes used as the original for the formulation of sound laws.

2.3.d The Sound Shift

At this point, it may be well to summarize the main points of Grimm's and Verner's laws--the first Germanic sound shift. According to this concept of the shift, proto-Indo-European maintained a consonant subsystem similar to those of the classical languages (particularly to Sanskrit)--the consonants were arranged along the fortis-lenis scale with *susurratae* (bh, dh, gh), *mediae* (b, d, g), and *tenues* (p, t, k). In the development of Germanic from this proto-Indo-European language, there was a general shift toward *provec-tion*, with the *susurratae* becoming *mediae*, the *mediae* *tenues*, and the *tenues spirantes* (ph [f], th or þ [θ], kh or h [x]). Within the word, however, when the accent followed the consonant the shift was reversed, with *tenues* becoming *mediae*. These developments are represented graphically in table 2-3.

Insofar as the relationship between Germanic and the other Indo-European language groups is concerned, the first Germanic sound shift as formulated states rather clearly that Germanic is an innovative development from a common Indo-European pattern maintained more conservatively in the other groups. Germanic can further be seen (in the shift) as an offshoot of the *centum* languages--of those that did not change the palatal **k̑* to *s* (or *ś*, or some similar sibilant)--and this removes Germanic one more step in the linguistic family tree from proto-Indo-European. Accordingly, we can construct a tree to include this information, as the familiar

Table 2-3. The First Germanic Sound Shift

<u>Indo-European</u>		<u>Germanic</u>	<u>I.E.</u>	<u>Ger.</u>	<u>I.E.</u>	<u>Ger.</u>
bh	>	b	b	> p	p	> f
			p	> b		
dh	>	d	d	> t	t	> θ
			t	> d		
gh	>	g	g	> k	k	> x
			k	> g		

one in figure 2-1.

2.4 PROBLEMS IN THE UNDERLYING ASSUMPTIONS

In finding problems in the first Germanic sound shift, we should not conclude that Jacob Grimm, Karl Verner, and the other linguists who contributed to the formulation of the traditional sound laws as we know them today were somehow incompetent, nor that their analyses were in any way improper. These nineteenth-century linguists were truly giants in the history of this fledgling science, and their analyses were the best that could be accomplished not only in the nineteenth century, but in the whole history of modern linguistics. The history of any analytical science proceeds slowly one step at a time, each step firmly based upon the last. Similarities between languages were a mystery of God for Giraldus Cambrensis, for the assumptions of the clerical framework and the sum total of the linguistic evidence available to him would allow no other conclusion. Indeed, his analysis of the situation was logically sound, and anything else would have been wild, unscientific speculation, regardless of how it may seem to us in the twentieth century with the benefit of seeing the "obviousness" of everything that has slowly developed over the centuries.

When we examine Grimm's and Verner's laws, then, we must do so not with the attitude that the analysts incorrectly interpreted their data, but from the realization that their excellent analyses were based upon a certain set of assump-

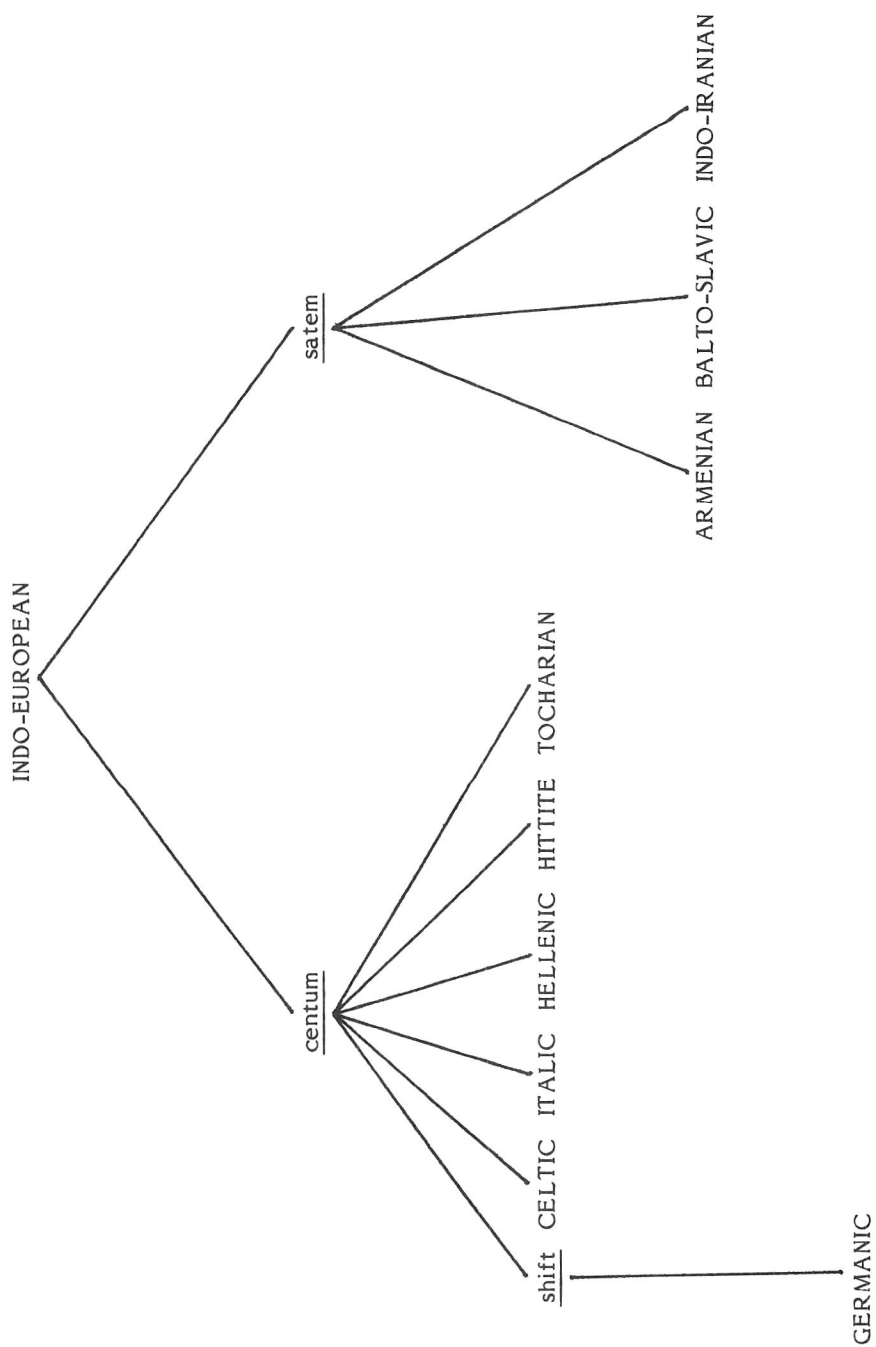


Fig. 2-1. Indo-European family tree (major groups)

tions peculiar to their times. The slow, gradual advances in the science of linguistics have caused these assumptions to change radically, and it becomes necessary for us to examine those analyses of a century ago to see which assumptions underlying them have since changed and may thus bring the analyses themselves into question. In particular, we should examine those assumptions that caused Grimm and Verner to conclude that the shift that marks the division between Germanic and the rest of Indo-European was indeed a Germanic one—that Germanic developed from a proto-Indo-European language that more closely resembled the classical languages in its consonant subsystem.

2.4.a The Primacy of Written Language

The first assumption that promoted the view that the classical languages were closer to the original proto-Indo-European held that written language was primary, and spoken language was merely an imperfect reflection of that written language.³⁰ The support this assumption gave to the primacy of the classical languages was crucial. On the most obvious plane, as Latin and Greek were written down far before Gothic, the primary aspect of these languages was older. With the discovery of Sanskrit, moreover, linguists found an even older classical language, and one that quite coincidentally maintained particularly close relationships with Greek.

There were also more subtle reasons for this assumption and its support for the classical languages—Latin and Greek

were the languages of learning. While this was a situation arising in the Middle Ages for social and political reasons (the prestige of Rome and the subsequent attempts to prolong its empire, the pervasiveness of the Roman Church, and the need for a *lingua franca*), it had its linguistic implications as well. After all, if Latin and Greek were the languages of learning, they would quite naturally have obtained some aura of legitimacy at the expense of the common spoken languages heard on the farm and in the street. Sanskrit maintained this same exalted position in India, reinforcing its status as a "legitimate" language, perhaps the most "legitimate" of all.

Latin and Greek were also the languages of linguistics; whatever was written about grammar was written in a classical language. In the nineteenth century there had been a popular belief that languages other than Latin and Greek simply had no grammars at all. While such a notion certainly did not directly influence the Indo-Europeanists of the nineteenth century, it probably influenced them indirectly because all grammatical studies were presented from the framework of the Latin language; for example, English verbs were conjugated in two numbers and three persons in spite of the fact that English maintained only one ending (-s), and English nouns were declined in five cases in spite of the fact that they had no case endings at all. Such practices could not have been completely ignored in determining the direction of the shift. And once again, this overriding assumption would have been bolstered by Sanskrit having been the language of linguistics in India as well.

The assumption that written language is primary, however, was eliminated by twentieth-century structural/functional linguistics. In their investigations of American Indian languages, for instance, American linguists reconstructed intricate relationships among languages and language groups from the basis of spoken language alone. It was not the case that a complex and "advanced" grammar depended upon written language and that this written language degenerated through its spoken use by the common people (as the relationship between Latin and the vulgar languages had been viewed until rather recently). Indeed, it was found that the distinction between more- and less-advanced grammars does not exist--all languages maintain roughly the same level of complexity.³¹

It is entirely possible if not probable that if Grimm and Verner had been asked in so many words whether the assumption of the primacy of the written language was valid and whether the classical languages were necessarily older for their being written, these two linguists may well have denied it. Such an assumption is not so much the product of contemplation, but the framework within which one works. Just as the English noun was forced into a framework within which it was declined in five cases not as a matter of contemplation, but simply as the way things were done, so the languages were arranged in the Indo-European family relationships with the protolanguage forced into the framework dictated by the classical languages.

There is one assumption underlying the conservativeness of the classical languages that is still maintained today. In

historical linguistics, the oldest attested forms should be used as the basis of reconstruction. This practice is logical, for languages do constantly change, and the older the form, the less opportunity it has had to change. For Indo-European, the oldest attested forms are in the writings of Latin, Greek, and Sanskrit.

It is not logical to assume from the principle of using the oldest attested forms that the classical languages are any more conservative than the Germanic at any single point in history. What this principle implies is simply that, for example, Late Latin is less conservative than Classical Latin, therefore it is more accurate to base reconstructions of proto-Latin on Classical. To extend this principle to the point of maintaining that the classical languages are more conservative than the Gothic of Wulfila's Bible (the first known writing in Germanic, A.D. 360) is extremely unsound, for it would assume either that Gothic is somehow an offshoot of the classical languages or that its history did not begin until it was written down. When expressed in this manner, it becomes clear that any use of the principle of the oldest attested form to show conservativeness among the language groups would merely be an extension of the old assumption of the primacy of written language. When Classical Latin was being written, some form of Gothic was being spoken that was more conservative than the Gothic of Wulfila and more or less conservative than Latin; and this earlier spoken Gothic may indeed have been so conservative as to make its descendant written by Wulfila even more conservative than the Latin of Cicero.

2.4.b Linguistic Entropy

Another assumption underlying the determination that the classical languages were more conservative than Germanic and that the shift was therefore a Germanic one was that of language entropy, as mentioned in section 2.2. According to this principle, whenever there is a process of change, something is lost or at least degenerates.³² For example, in producing metal from ore, much substance is lost through smoke, soot, and heat.

Changes in language were traditionally viewed in much the same way. In the development of French from Latin, for example, many endings and complex grammatical constructions were lost, and the subsequent language has become apparently less complex or (to use a rather charged term) more degenerate. It is quite reasonable to suppose that the more complex grammars of Latin and Greek, with their many endings, were the more conservative given such an assumption. In Germanic, on the other hand, we could argue that there have been more changes (that the language group is more innovative), for there are fewer endings.

This attitude may have sufficed for the grammarians of the eighteenth and nineteenth centuries, but modern linguists have since discounted the argument entirely. The modern theory holds that languages maintain a homeostasis of complexity among the various components--the semantics, syntax, morphology, and phonology.³³ Thus, for instance, as English lost its many inflectional endings, its morphology

tended to become simpler. The nineteenth-century linguists who followed Ludolf's premise that the grammatical forms (morphology) should be examined for language relationships would quite naturally see a degeneration. Modern linguists, however, with their greater attention to syntax, would point out that as the morphology simplified, the syntax became concomitantly more complex. The homeostasis of language systems maintains that loss in one component be made up in another.

The application of entropy to language change further defies logic when the larger questions of language origins and diversification are considered.³⁴ Unless language really had been a gift of the gods, presented in all of its divine complexity to humans made ready for its comprehension, then somewhere in the development of the world's languages there must have been some very complicating changes indeed that would take us from the simple labeling of objects in and around the cave all the way to Homer's *Iliad*. Moreover, from relics and irregularities in languages, we still see the evidence of past morphological complications added to these languages (for example, we find a great many variations among the Germanic strong and irregular weak verbs--English sink, sank, sunk, but think, thought, thought).

2.4.c The Racial Factor

Yet another assumption underlying the determination that the shift proceeded from a protolanguage more closely resembling the classical languages concerned the racial

origins of the Europeans. That the European race originated in the Caucasus mountain region and spread westward to Europe was the prevailing belief until quite recently. Inasmuch as the Caucasus mountains are close to India and an earlier or even contemporary migration to India would have taken root in India much earlier than in Europe, it was supposed that India, in its relatively stable and more peaceful environment, would have preserved the Indo-European protolanguage much more faithfully than would the European languages, subject so much longer to the disruptions of migration and confrontation with other peoples.

There are basically two problems with this line of reasoning. One, it rests upon a faulty notion that race and cultural group are one and the same. As modern anthropology has determined, race is a genetic classification of people, while culture is based upon language and customs. Just as one race may be made up of several significantly different cultural groups, one cultural group may contain several different races.³⁵ Perhaps nowhere is this more evident than in the United States, where the descendants of immigrants from all over the world speak the same language and observe the same customs with relatively minor variations. The origins of a particular race, then, do not necessarily have anything to do with subsequent cultural practices and diversifications. And two, modern archaeologists and anthropologists have found through extensive examination of numerous ancient sites that the migration of the Kurgans (from the Caucasus region) to central and eastern Europe far preceded the breakup of the Indo-European cultures.

That is to say that first this group migrated to an area around central and eastern Europe and settled, establishing the basis for the Indo-European language and culture there. It was considerably later that this group broke up and migrated throughout Europe and to the south and east.³⁶

This is perhaps one of the most damaging blows to the notion that the Indo-European protolanguage is maintained more faithfully in Sanskrit than in Germanic. For the same reason that the traditional line of thought concluded that stable and nearby India had the more conservative language and that unstable and far-away Germany had the less conservative language, we now see that modern evidence would force the opposite conclusion. The most conservative of the Indo-European languages should be found in Germanic, and perhaps more precisely in Gothic (East Germanic), if geography played any role at all. (See section 5.3 for a more extensive discussion of the anthropological and archaeological evidence.)

Thus far, we have seen that three of the key assumptions that entered into the determination that the shift proceeded from something like the classical languages to Germanic have been obviated by the evidence of twentieth-century linguistics and anthropology. One more assumption, the reliability of the greater number, has been displaced by B artoli's norms (section 1.3.a) and is discussed further in section 5.1, as it is more effectively treated as a piece of corroborative evidence.

These problems with the traditional view of the sound shift should at the very least prompt a reexamination of the

evidence with the object of a reclassification of language relationships. That this has as yet not occurred, however, may be taken as evidence of the force of inertia in science, or it may be taken as a tribute to the greatness of the nineteenth-century linguists who formulated the first Germanic sound shift.

Before entering into such a reexamination of the evidence, we should recall that the basic approach to be used in this investigation was stated as being phonetic/phonological. We should therefore not neglect the phonetic assumptions underlying Grimm's and Verner's laws, but we should examine them especially. Thus, the following section is devoted to these problems in the traditional sound laws.

2.5 PROBLEMS IN THE PHONETICS OF THE SOUND SHIFT

While a more detailed treatment of the dynamic phonetics/phonology involved in the sound shift is presented in the next two chapters, it should be helpful here to point out the main problems with Grimm's Law from the standpoint of traditional segmental phonetics--the framework which has been available to historical linguists throughout the first three quarters of the twentieth century. Once again, however, I must stress that Jacob Grimm himself was quite advanced for his time, and any criticism implicit in this treatise as a whole and the notation of these phonetic problems in particular ought not be taken as criticisms of

this linguist, but as contributions to the field that would not be possible had he not made his tremendous contributions in the last century. If there be any criticism, then, it should be directed to the vast majority of twentieth-century linguists (with some significant exceptions, as noted in section 5.2)³⁷ to whom this evidence has been available and who have chosen to ignore it and to take the easy and convenient route of simply passing Grimm's Law on to their students unquestioned.

2.5.a New Findings in Phonology

Early in the twentieth century, at the very inception of modern structural/functional linguistics, Antoine Meillet was investigating the general rules that appeared to govern sound change in the Germanic languages. In his Caractères généraux des langues germaniques of 1916, Meillet observed that "Certain principles of change are universal; for example, one will not be surprised to see the tendency to reduce the finals, to see intervocalic consonants undergo the influence of neighboring vowels and thus be made like them by becoming voiced or by losing a part of their closure. . . ." ³⁸

We should expect certain things to occur, when we apply Meillet's observation to the consonant subsystem of Germanic and Indo-European in general at the time of the first Germanic sound shift. Along the fortis-lenis scale that provides the foundation for the shifting, we should expect consonants at the end of words or between vowels to shift from one degree to another such that voiceless consonants

become voiced and stops become fricatives (losing part of their closure). Thus, among the allegedly original *susurratae*, *mediae*, and *tenues*, we should expect the voiceless *tenues* to shift to their corresponding voiced *mediae*, and we should further expect the fully closed stop *mediae* to shift to their corresponding partially closed fricative *susurratae*.

Meillet's observation was based on the examination of numerous cases of language change. Such observations as these were taken together with the principles from the growing discipline of phonetics and were incorporated into the study of phonology as markedness criteria, demonstrated in the previous chapter. In his monumental Grundzüge der Phonologie of 1939, Nikolai Trubetzkoy summarized the markedness criteria with reference to his oppositions. For example, he noted the following:

If the functioning of the phonemic system points to t as the unmarked member of the opposition t-d, the opposition t-d must be considered privative. The tensing of the muscles of the tongue must then be considered an irrelevant side phenomenon, the degree of voicing of t being "zero," so that t is to be regarded as "voiceless" and d as "voiced". But if, on the other hand, in accordance with the functioning of the phonemic system, not t but d is the unmarked member, voicing becomes an irrelevant side phenomenon, and the tensing of the muscles of the tongue the discriminative mark of the opposition. t must then be considered "tense" and d as "lax."³⁹

The fortis-lenis scale follows the pattern of a tension system. Change in a "neutralizing" environment (that is, one in which the opposition is weakened, see section 1.3.c)

should thus proceed from the strong member of the opposition--the marked--to the weak member--the unmarked. In the position between vowels or at the end of a word, a consonant is thus under pressure to weaken, and in a tension or fortis-lenis system this means that the direction of change should be from t to d.

2.5.b Grimm's Law Revisited

We find a major problem when we compare Grimm's Law with the evidence from the observations of attested change in languages and from the markedness criteria established on the basis not only of observation but also of phonetic principle. In the environment that should be indicative of a change "down" the fortis-lenis scale, Grimm's Law maintains a change "up" the scale--in precisely the opposite direction. For example, the *susurratae* in intervocalic position in Sanskrit became *mediae* in Germanic, as we find in such correspondences as Sanskrit drbhāti 'winds' and Old High German zerben 'to turn', Sanskrit boddhār 'knower' and Old Saxon biodan 'to present', Sanskrit steighnōti 'climbs' and Gothic steigan 'to climb'.

One could object that perhaps Grimm was correct and the more modern evidence is somehow deficient. Such an objection cannot be entertained for two solid reasons. First, the pattern of change from the marked to the unmarked in these environments is not only supported by consistently converging observations of known, living languages, but it is also fully consistent with phonetic principles.⁴⁰ If Grimm's

Law were correct and if the shift had proceeded from the consonants realized in the classical languages to their counterparts in the Germanic, then this shift would stand as a unique anomaly in the history of the world's languages and the sole contradiction to the principles of phonetics in sound change.

Second, the shift in question occurred in prehistoric times. If we were to find such a shift actually attested in a living language, then that shift would have to be taken as a fact. The first Germanic sound shift, however, has been reconstructed from the evidence on the assumption that it proceeded from the classical-language consonants to the Germanic. In effect, we have here a case of assumption without reliable evidence.

One could also object that the strengthening pattern of change is indeed attested in the second or High German sound shift.⁴¹ While this argument is often put forth, it is based entirely on the observation that some consonants in this latter shift changed to the next higher degree along the fortis-lenis scale. What is generally ignored is that the consonants involved were either heavily stressed or geminate (double). As such, the change involved in this case was not the general type of shifting from single consonants between vowels as we find in Grimm's Law, but a highly contextually motivated protraction (see section 4.2).⁴²

The major problem with Grimm's Law from the standpoint of phonetics and phonology, then, is that the law is essentially backward. In environments that should cause, if any change at all, a weakening of the consonant through

lenition, Grimm's Law would have a strengthening of the consonant through provection. Moreover, inasmuch as the evidence of phonetics and phonology is consistent with all attested changes in languages and with physiological and acoustic necessity (as will be more clear in the following chapters), while Grimm's Law deals with a prehistoric (un-attested) shift subject to a great extent to speculation, it should be quite clear that this problem is far more serious than the problems noted in section 2.4. Whereas the problems in the previous section had to do with changing assumptions about language, this current problem involves the plausibility of the shift directly.

2.5.c Verner's Law Revisited

When we turn our attention to Verner's Law, we would naturally expect to find much the same problem. After all, Verner did base his sound law (an exception to Grimm's Law) on the premise of Grimm's determinations, and if Grimm's Law is backwards with respect to the phonetic evidence, then the same may be expected for Verner's Law.

At first glance, this would appear to be the case, for Verner's Law specifies that a consonant occurring between vowels where the second was accented in proto-Indo-European (particularly as exemplified in Greek and Sanskrit) underwent lenition from the tenuis to the corresponding media. Thus, for example, we find Greek hypér 'over' corresponding to Old High German ubir, Sanskrit pitár- 'father' to Gothic fadar, and Latin sēcāre 'to cut' to Old High

German sega 'saw'.

There appear to be problems with Verner's Law. It relies upon a change in Germanic on the basis of a proto-Indo-European accent—an assumption that the accent changed in Germanic and not in the other language groups. While this problem is more logical than phonetic, there is also a more solidly phonetic objection concerning this accent. If the accent were on the second vowel, then the consonant concerned would be in the initial position of an accented syllable. This is an environment of consonantal strength that should, if anything, lead to provection from media to tenuis. For example, in the Welsh word pysgodyn 'fish (sg.)', the dental consonant follows the stressed vowel and is realized as a media, but when the stress accent shifts to the position following the consonant in pysgotā 'to fish', the media becomes a tenuis (compare section 4.2.a).

We could very neatly say that as Grimm's Law is a case of strengthening (provection) occurring in a phonetic environment calling for weakening (lenition), Verner's Law is a case of weakening occurring in a phonetic environment calling for strengthening. Inasmuch as Verner's Law is set up as an exception to Grimm's Law, this view would certainly appear to be a logical one, for as the basic law is backwards the exception would also be backwards.⁴³

The situation, however, is not at all so neat. Unlike Grimm, who based his analysis only on the letters involved, Verner considered the phonetic possibilities. He also believed that Grimm's Law was essentially correct and sought an explanation for the exception that would not only be pho-

netically sound, but retain the features of the first Germanic sound shift. The answer to his dilemma concerned the placement of syllable divisions:

"I probably need not remark that here we must not employ the modern hyphenation fa-dar, finp-an; all the consonants following the vowels belonged to the preceding syllable (fad-ar, finp-an), as indeed Germanic versification also attests (the Old Norse hendingar, assonance rimes)."⁴⁴

If the consonant did indeed occur in final position of an unaccented syllable, then it could certainly have been subject to weakening. With the accent beginning with the following vowel, there would be a break in pronunciation, and this final position would be weakly articulated by virtue of being pronounced not only in an unaccented syllable, but also in what would essentially have been a final position. Final position is also a position of consonantal weakening, according to the observations of Meillet and also in keeping with markedness (in a tension system, compare Welsh tlawd 'poor' with its superlative tlotach--section 1.3.c).

This aspect of Verner's Law is correct not only with regard to the phonetics of final position, but also with regard to alternations within Germanic itself. For example, Meillet also points out some evidence from the causative verb suffix:

The presents of the type called "thematic" with radical vowel e, the type to which most Germanic strong verbs belong, had the accent on the initial syllable, while the causatives had the accent on the suffix; Sanskrit thus opposes vārdhati, 'he believes,'

to vardhāyati, 'he causes to believe.' For sibilants and spirants, this is represented in Germanic by alternations between voiceless and voiced pronunciations: Got. fra-waraipan, 'to perish' (cf. Skr. vārtate, 'he turns') but fra-wardjan, 'to cause to perish' (cf. Skr. vartāyati, 'he causes to turn').⁴⁵

(Although the d may well have been the voiced fricative [ð] in the pronunciation of Gothic and the alternation may be viewed as that between voiceless and voiced fricative, this d did in fact derive from the historical [d] and not from the p [θ] with which it alternates. Thus, for purposes of reconstruction, we may take the d at face value as [d].)⁴⁶

The alternation between d and p ([θ]) is clear evidence that the original consonant involved was some form of aspirata [t^h] (and this choice--over that of tenuis--is clarified in Chapter 4; see also section 3.1.b). In the causative, the accent would have been on the suffix, which began with a semiconsonant [j] and thus clearly placed the consonant in question in final position of an unaccented syllable. This position of consonantal weakness brought about the lenition to [d]. On the other hand, the present-tense infinitive maintained the consonant in final position of an accented syllable or (taking the more conservative position mentioned above) in initial position of the following syllable. In either case, this consonant did not undergo lenition.

From the viewpoint of phonetics and the phonology of historical change, then, Verner's Law appears to be correct. Now we are faced with a dilemma. Grimm's Law is most certainly backwards; Verner's Law is an exception to Grimm's Law; and Verner's Law is essentially correct. How

can a sound law that is correct be an exception to a sound law that is incorrect?

The answer to this dilemma is really quite simple when we recall that if Grimm's Law is backwards, then the general pattern of the sound shift is from Indo-European to Germanic, in the direction of lenition, or change "down" the fortis-lenis scale. Verner's Law is also a change of lenition. While Verner's Law may have been viewed as an exception to the backwards Grimm's Law, it is perfectly in keeping with the direction of change (phonetically) in the shift when seen in its correct form of lenition.

While both the shift and Verner's Law may be in keeping with the phonetic direction of the change, they appear to be at odds with regard to the language relationships involved. As Germanic broke away from the rest of Indo-European or vice versa, are we to believe that a shift occurred simultaneously in the direction from Germanic to the classical languages (the general sound shift) and from the classical languages to Germanic (Verner's Law)?

The answer to this question is quite simply yes. As the split occurred (with far more linguistic ramifications than the shift, by the way), Germanic made its system more regular and consistent through its own changes (Verner's Law), as the rest of Indo-European did the same (the general shift). To say that there is some problem in this is to confuse language with a living organism, which splits in a deliberate method. The diversification of languages in actuality proceeds from the isolation of different speech communities, and each speech community simply develops independently of

the others, with no regard for the manner in which the others may change.⁴⁷

If anything, Verner's Law adds corroboration to the basic phonetic problem faced by Grimm's Law: In a position of weakness along the fortis-lenis scale, a consonant may change by lenition to the next weaker member of the scale; it should not change by provection to the next stronger member. The only mistake made by Verner was in assuming the correctness of Grimm's Law. Had Verner formulated his sound law independently of Grimm's Law (as it applied to the development of Germanic), his law would have been no less correct, and it would have avoided lending credence to the first Germanic sound shift. While such an observation is easy to make now, we must bear in mind that in 1875 there was simply no contradicting the first Germanic sound shift, for the assumptions supporting it were quite strong and the phonetics contradicting it had not yet been developed.

2.6 CONCLUSION

In this chapter, we have seen that the development of the sound law was a slow process, with each new determination made on the basis of those that had come before and also on the basis of the fundamental assumptions about language in general and the Indo-European languages that were maintained at the time of the determination. This historical perspective on the progress of linguistic science is quite important to our understanding of the first Germanic

sound shift and its place in linguistics, anthropology, and other areas in which it might have some effect. By looking at the major, representative steps in the development of the concept of the sound law, we should be able to see that the advancement of this or of any concept in science is a product not only of the evidence, but also of the attitudes and assumptions that have come before a new determination and that dominate researchers' thinking at the time of the new determination.

When we approach Grimm's Law and the whole question of the first Germanic sound shift, we must recognize that no matter how great a linguist Jacob Grimm may have been and how much we quite properly respect him now, his determinations were limited by assumptions that have since been replaced and, more importantly, by principles of phonetics that have since evolved. It should come as no surprise that new assumptions and new phonetic evidence should contradict his sound laws not in a sudden upheaval contradicting all that has come before, but in the natural flow in the development of the science.

The old assumptions that language is primarily written, that spoken language is a mere imperfect reflection of written language, that language is subject to inexorable entropy and must degenerate, that the Indo-European cultural group spread its already-developed culture from east to west, and many more minor but certainly contributory assumptions have all been not only contradicted, but for the most part reversed in the time since the development of Grimm's Law. From evidence collected in the meantime, we

now know that language is primarily a spoken medium; most of the world's three thousand or so languages have not yet been committed to writing. If Sanskrit, Greek, and Latin were written down earlier than was Gothic, this implies nothing about their relative chronologies or their relationships with one another. Because Sanskrit accounts for the oldest writing does not mean that it preceded Germanic in development or even that this writing demonstrates any significantly more conservative form of Indo-European.

Moreover, languages do not simply degenerate, but trade complexity in one component for complexity in another. A rough homeostasis of complexity is maintained among phonology, morphology, syntax, and semantics through all of these changes. Thus, descendants of proto-Indo-European show a great variety in their complexity: English, for example, maintains an extremely complex syntax; Greek a complex morphology; and Welsh a complex phonology (with its many consonant mutations). One cannot suppose, then, that the complex morphology exemplified by the classical languages degenerated into the simpler morphology of the Germanic.

Insofar as the origins of the Indo-European cultural group are concerned, anthropological and archaeological evidence has since shown that the dispersal of this culture took place not from east to west, but from west to east, as treated in more detail in section 5.3. The changes in the previous assumptions merely make it no more likely that Sanskrit and the other classical languages represent a more conservative linguistic system than Germanic; rather, this

change indicates that if the migration patterns of the culture matter at all, then they should indicate that it is Germanic that would be the more conservative (indeed, the most conservative among all the Indo-European languages).⁴⁸

With these changes in the assumptions underlying the first Germanic sound shift, the implications of the newer phonetic evidence should come as no great surprise. In the type of language exemplified in the shift, the phonetic characteristics involved indicate that in at least some of the instances of shifting (and more are examined in Chapter 4), where Grimm's Law requires a change from lenis to fortis (a provection or strengthening), the only possible change would be from fortis to lenis (a lenition or weakening). On the basis of phonetics, of attested change in other languages, and of the phonological markedness criteria developed from both of these areas, we must conclude that Grimm's Law is at least partially backward.

We find further problems for the first Germanic sound shift in Verner's Law. Basing his sound law on phonetic principles, Verner found a pattern of change that did indeed proceed from fortis to lenis. This law by itself is rather sound and is still supported by the evidence collected in the century since its formulation. On the other hand, it can be confusing and misleading if it is taken as an exception to Grimm's Law.

It is not enough, though, simply to point out the problems with the first Germanic sound shift and its implications for the position of Germanic among the Indo-European language groups. If this shift is unreliable or downright

false, then a viable alternative must be presented that not only will take its place but will also give us the insights that have come from more than one hundred years of developments in historical linguistics, phonetics, anthropology, and all other fields that contribute to our understanding of language.

As the historical development of the sound law should show, however, the alternative to the first Germanic sound shift--the Indo-European sound shift--may replace Grimm's Law in current and future investigations, but it could never diminish the place Grimm's Law holds in the growth of modern linguistics. Without that monumental achievement by Jacob Grimm, our understanding of the position of Germanic in Indo-European could not have progressed. Without the formulation of a first Germanic sound shift (flawed as it may be), we could not construct an Indo-European sound shift.

CHAPTER 3

DYNAMIC PHONOLOGY: THE BASIS OF THE NEW SOUND LAWS

As we have seen in the previous section, Grimm's Law and hence the basis of the first Germanic sound shift is problematical even in the traditional segmental approach to phonetics and phonology, within which the Indo-Europeanists have been working. In recent years, though, the segmental tradition itself has come into question and is gradually being displaced by a new approach to phonetics and phonology that analyzes speech sounds and constructs sound systems more directly and more reliably from the nonsegmental continuum of speech itself. This new development within linguistics has drastically altered traditional analyses that have not been as problematical as the first Germanic sound shift. We may expect, then, that this new dynamic approach will shed more light on the phonetic features and their phonological patterns involved in the shift that separated Germanic and Indo-European.¹

3.1 THE SEGMENTAL TRADITION

The segmental tradition has been a constant factor throughout the development of the sound law and the reconstruction of the proto-Indo-European consonant system. Originally, this tradition was maintained in the alphabetic (orthographic) symbols used in the determination of correspondences, and indeed such correspondences existed not necessarily between actual uttered sounds, but between letters (as we see below in section 3.1.a). We should not expect anything different, for the phonetic sciences did not evolve until well into the nineteenth century, and the only tool early researchers had in their investigations of sound change was the letter. This was particularly true of investigations into prehistoric sound changes, for the phonetic reconstruction of sound was an even later development in the phonetic sciences.²

Moreover, there was also a principle behind the use of letters from a language's orthography rather than that of sounds as uttered (or as reconstructed). The primacy of written language quite clearly required that all sound-related investigations and reconstructions concern themselves not with the imperfect and degenerate sounds of spoken language, but rather with the pure form found in the written letter. Indeed, relics of this principle are still to be found in phonemic theory,³ and the displacement of the segmental phoneme by dynamic analysis may thus be viewed as yet another step in the gradual elimination of the principle of

the primacy of written language.

3.1.a Orthographic Analysis

In the development of the traditional sound laws making up the first Germanic sound shift, Jacob Grimm followed the practices, principles, and assumptions of his predecessors in considering written language as primary. In all of his formulations he quite deliberately used letters rather than the phonetic values of sounds.

While such an approach would appear to be primitive or even atavistic if suggested today, it does have one distinct advantage: Writing systems tend to be conservative, maintaining letters representing sounds long since changed in the spoken language. For example, in English, with one of the most conservative (or out-dated) writing systems, we find such spellings as laugh pronounced [læf] and through pronounced [θru:]. It is the maintenance of the gh in spelling where [f] or nothing is pronounced today that serves as the link with the German cognates lach- and durch. Without this nonphonetic spelling, English would appear much less closely related to German, and in our determination of sound correspondences and sound laws, we might overlook some important facts. The simple use of letters at face value in ancient writing systems rather than the analysis of these systems to determine the precise sounds underlying the letters served to satisfy one of the oldest and most constant principles of historical linguistics--the use of the oldest attested form in reconstruction. (The conservatism of or-

thographies could appear to bolster the position of Sanskrit had the changes involved in the shift not predated the writing systems of the various language groups.)

In spite of this advantage, however, the use of letters in linguistic analysis and reconstruction is more a liability than an asset. It has not been until very recently that any systematic attempt has been made by linguists to assure phonetic or phonological consistency in the development of writing systems, or orthographies. In the final analysis, the use of one written symbol or another is and has been largely arbitrary.⁴

Even if a written symbol is fairly consistent and widespread, the use of that letter in one language cannot be equated with its use in another. For example, it fits the Welsh orthography quite well to use the letter w as the vowel [u]. This leads to such combinations as bwlch [bulx] 'pass', which speakers of English and other European languages deem unpronounceable if they are not familiar with the system, for w is used in other languages as a glide or consonant.

Such extreme cases, though, are not as potentially damaging to comparative analyses as are the more subtle differences in the realization of letters in cognates. For example, both French and Swabian maintain an opposition between b and p. In French, this opposition is based upon muscular tension, such that b is lax and voiced and p is tense and voiceless without aspiration. In Swabian, the opposition is based upon aspiration, [b] is lax (and may be voiced or voiceless) and [p] is tense, voiceless, and aspi-

rated. In borrowing the French word pardon 'pardon me', Swabians have rendered it [ba:dõ] in their pronunciation, for the p of the French system is more closely related phonetically to the [b] of the Swabian. If taken at face value, a Swabian writing of bardon would thus give the appearance of a sound change from the French pardon, although no change is involved. The false appearance of a sound change occurring in Swabian after the borrowing would derive from the conflicting peculiarities of the two sound systems and not from any change.

3.1.b. Segmental Analysis

Recognizing the dangers of using letters rather than sounds as the basis of comparative analysis, Karl Verner and linguists following him have based their analyses on phonetic principles rather than on orthographies. The advantages can be seen quite readily in such analyses as the syllabication involved in Verner's Law (described in sections 2.3.c and 2.5.c).

It was and still is important to take into account the letter used in the oldest attested forms. For example, the use of d in the Gothic form fra-wardjan 'to cause to perish' as opposed to p in fra-wairpan 'to perish' shows us quite clearly that the original sound in both was [t] or [t^h], for the tenuis or the aspirata alone could establish such an alternation between d and p. In actual pronunciation, however, the d of Gothic had probably already come to be pronounced as the susurrata [ɖ], a sound which would (with-

out historical or orthographic evidence) mislead the linguist into attributing the alternation between [d] and [θ] to voice rather than to aspirate tension. Such a mistaken analysis would in turn cause the linguist to miss the proper reconstruction altogether. It is still important, though, to take the phonetic pronunciation into account, for the alternation between the *susurrata* [d] and the spirans [θ] was apparently generalized to [z] and [s] in precisely the same environments and thus fit into a phonetic alternation pattern that became important in the Germanic languages after the shift had been completed.⁵

There was one clear disadvantage in the use of phonetic transcription in the analysis of sound change with or without the added use of letters where appropriate. While the determination of a precise phonetic sound and its rendering in transcription provided a much more reliable basis for analysis at any particular stage in a language's development, it was nonetheless tied to the notion of an alphabetic writing system. For example, whether we treat the sounds involved in the alternation just cited as d and þ or as [d] and [θ], we are still dealing essentially with letters—one as written in an orthography and the other as written in phonetic transcription. To be sure, the latter can be more precise and more reliable than the former; but it is still an alphabet.⁶

The basic problem with the alphabetic approach to sound representation is that it is segmental. As described in section 3.2, speech is produced in a continuum of sound—there are no breaks corresponding to letters (whether they be orthographic or phonetic). For example, if we note the posi-

tion of the lips and tongue in the production of the words feel [fi:l] and fool [fu:l] (being sure to maintain the "pure" vowel sound throughout the words),⁷ we can readily tell that the vowel in each case is produced not simply after the f and before the l, but during the articulation of these consonants as well. Segmental theory, which underlies the phonetics from Verner's Law to most of contemporary analysis, would split the words into three units each (consonant + vowel + consonant) and would attribute the differences in the consonants to the influence of the vowels. Thus, for example, [fi:l] would be made up of three discrete sounds, or phones, realized in linear succession; the difference between the phone [f] of [fi:l] and the phone [f] of [fu:l] would be attributed to the influence of the vowels, and these realizations of [f] would be considered "allophones"; and finally the allophones would be classified as contextual variants of an abstract phoneme /f/, which is the same in /fi:l/ as in /fu:l/ (on the abstract phonemic level).

Segmental theory has been an important tool in the advancement of linguistics in the twentieth century. By providing a more reliable alphabet and by allowing researchers to look further into the detail of sound than the letter, it has led to a fuller understanding of the individual characteristics, or features, involved in sound production and perception (for example, the feature of voicelessness in the [f] as opposed to the feature of voicing in the corresponding [v]). Indeed, without the segment phonetics, phonology, and linguistics in general could never have advanced to the level of development at which they stand today.⁸

Segmental theory is basically faulty in spite of its many contributions. As phoneticians using advanced instruments such as the sound spectrograph (electronically turning sound into visual readouts) and cineradiograph (synchronizing x-ray moving pictures with the spectrograph) have affirmed, speech cannot be reduced to discrete segments (bundles of features) following one another in neat progression, at least not without losing potentially vital information in the process. The effects of one feature on another in the continuum of speech cannot adequately be taken into account if these features are bundled together into segmental phones and represented alphabetically (as demonstrated in section 3.2.d). This failing of segmental theory is not merely a problem in detail, unimportant in the big picture of sound and sound change; rather, this detail lies at the very center of sound change and is often the impetus for the change itself, as we shall see in the underlying justification for the Indo-European sound shift in the next chapter.

Segmental theory has been replaced by dynamic phonetic analysis in current phonetics. Rather than bundling features into phones and representing them in neat, discrete segments progressing from left to right across a page, dynamic phoneticians maintain the features in the same relationships in which they have been found to occur in the natural production and perception of speech.

Before going on to the description of dynamic phonetics and phonology, there is one point that ought to be stressed. While segmental phonetics has been found to be faulty and certainly should be replaced by the more reliable dynamic

phonetics, we must bear in mind that dynamic phonetics could not have come into being without the many contributions of segmental phonetics. Here in phonetics, then, we find the same situation as in the history of linguistics in general--progress is accomplished one step at a time, as the evidence and assumptions of one stage in the progress give way to new evidence and new assumptions.

It is no accident that the stage of development for historical linguistics in which Grimm's Law may be replaced by new, more reliable sound laws coincides with the stage of development for phonetics in which segmental analysis is replaced by dynamic phonetic analysis. As we see in this chapter and the next, the sound laws that replace the first Germanic sound shift are a natural outgrowth of the dynamic aspects of speech that replace the segmental.

3.2 THE DYNAMICS OF THE SPEECH EVENT

Segmental phonetics and phonology are the heirs of the old linguistics based upon the letter, with all of the previous assumptions about the primacy of writing. In that older approach, the results of phonetic analysis and experimentation and the determination of phonological relationships have been made to fit into the left-to-right representation of the written alphabet. As such, it is a very natural and lucid example of the gradualness of scientific advancement.

Dynamic phonetics and phonology, on the other hand, represent the final break with the tradition of alphabetic

writing.⁹ To be sure, forms of instrumental writing--the spectrogram and the cineradiogram--are also at the basis of this new approach as well, but the instrumental writing is a direct representation of speech as it is uttered. As such, this "writing" qualifies as direct evidence itself, rather than as interpretations of the evidence.

Because we have thought of language in terms of writing since the early years of our phonic training, it is difficult for us to conceptualize the new dynamic phonetics. Indeed, the more linguistic education we have had, the more difficult it is for us to break with the practice of viewing the letter (phonetic "sound" or symbol) as inherent to speech sound itself. We may compare our situation to that of medieval astronomers, who had always known and even observed that the sun, moon, planets, and stars revolved around the earth, and who were suddenly presented with Copernicus's view of the solar system.

In order to achieve some understanding of dynamic phonetics (whether we be phonologists, philologists, or interested nonlinguists), we must first back away from writing or any representation of speech on paper and consider speech as it is produced in the body.¹⁰ In the normal speaker, speech is initiated from the act of forcing air from the lungs. While such an observation may seem trivial (and in segmental descriptions of speech, this fact has traditionally been taken for granted), in the dynamics of speech production it is crucial. The airstream traveling up from the lungs acts as a force against which the vocal apparatuses (usually described as "producing" speech by themselves) resist, and it

is through this resistance that speech is actually produced.

3.2.a The Laryngeal Constraint

The first resistance felt by the airstream occurs at the vocal cords in the larynx. These cords are tissues that are drawn perpendicularly across the airstream, hindering or constraining it to some degree. If the cords are drawn so tightly across the airstream that they stop it altogether, the result is a consonantal glottal stop, as one hears at the beginning of each syllable in the informal expression of 'no' in English--uh-uh. The main physiological function of this position is for building up pressure for sudden release in a cough. If the cords are left wide open in their position of rest, one hears nothing but normal breathing. Thus, in the two extremes (although the first may be used extensively in language), the primary purpose is physiological, having to do with breathing and not primarily with speech.

Between these two extremes, however, is a continuum of possibilities for constraining the airstream. For practical purposes, we usually divide this continuum into two categories--voice (or voicing) and whisper. In voice, the cords are drawn rather tightly across the airstream in such a manner that the airstream must force its way through the constriction, as air might be forced from a balloon when the opening is drawn tightly across its path. Just as in the balloon, the airstream forcing its way through the larynx and against this resistance sets up vibrations in the vocal cords. In most languages, the important characteristic (fea-

ture) of voice is simply whether it is present or not, but this vibration can certainly be divided into degrees of voicing--numbers of vibrations per second.

On the other hand, the vocal cords may be drawn loosely across the airstream, constraining it just enough so that one hears the friction of the air against the cords (in a rushing or hushing sound), but not enough that there is any vibration. This is whisper, and it can be effected in speech in general simply by whispering--making sure not to cause any vibrations. Within the sounds of speech, we can hear the difference between voice and whisper by forcefully uttering the words vee and fee. In the first we hear vibration during the [v] (and if a hand is placed over the larynx, it can be felt), while in the second there is none--only whisper during the [f].

Typically, vowels are produced in conjunction with voice. In a word such as fee, then, the laryngeal activity (the degree of constraint applied by the vocal cords against the airstream) is first whisper and then voice. It is not a simple act of first applying whisper and then voice, however, for the whisper derives from yet another constraint on the airstream further along its dynamic progression, or flow. Indeed, if we pronounce the word slowly enough (or better, if we slow down a tape recording of it), we may notice that the switch from whisper to voice may occur during the consonant or during the vowel, producing such sounds as [fvi:] or [fii:] (the circle denotes voicelessness or whisper).

Because of the vibration or frication (the friction of whisper), the airstream at this first point of resistance or

constraint takes on two natures. On the one hand, it is still a physical flow of air, forcing its way through the vocal apparatuses on its way to the outside. On the other hand, it is also an acoustic phenomenon--vibration or noise occurring within the vocal apparatuses destined to be heard in one form or another. It is this latter nature of the airstream that now takes on primary importance.¹¹

This is the point at which we generally consider speech sound to begin. Without some constraint in the larynx, there would be no fundamental sound in speech--only breathing. In acoustics, we term this fundamental sound the fundamental frequency, which is simply the number of vibrations per second created by simple voicing in the speech of an individual.

3.2.b The Syllabic Constraint

From the larynx, the airstream with its fundamental frequency proceeds in its dynamic flow up to the oral and nasal cavities. It is the configuration of these cavities that further constrains the airstream and assigns vowel or syllable characteristics.

To see what happens at this point, we should first consider the event from the perspective of a simple physical and acoustic experiment. If we blow through a reed (a musical instrument, duck call, or simply a blade of grass held tightly), we gain a set fundamental frequency, or number of vibrations per second, for each event. If, however, we play the reed into containers of various sizes, the

ultimate sound is different in each case. The ultimate sound is likewise different if two containers have the same volume but are different in shape.

This experiment demonstrates the effects of the resonance chamber. A fundamental frequency entering an enclosure or even a tube will be enhanced by its echoes from the walls (its resonances), just as will a person's voice in a closed, empty room. These resonances differ, of course, with each change in the size and shape of the chamber. While the formulas determining the precise effect and the underlying reasons for them may be of interest to an acoustic engineer, for our purposes it is enough to say that each new dimension, each new configuration of a chamber, possesses its own characteristic pattern of frequencies enhancing the fundamental frequency. We call these patterns formants.

Returning now to the oral cavity, we can see that the fundamental frequency derived from the constraint of the airstream at the larynx in effect enters a resonance chamber. There are several physical characteristics in this chamber that will affect the formants produced as the airstream (the fundamental frequency of vibrations) passes into it. In addition to the given size of the mouth, there is the height of the jaw--if the jaw drops, the volume of the chamber increases. Moreover, the lips can be protruded (pushed forward and rounded), increasing the length of the chamber.

The most intricate method of varying this chamber lies with the position of the tongue. The most flexible part of the body, the tongue can vary the configuration of the

chamber in a practically limitless number of ways. Specifically, in its central position within the chamber, the tongue can hump upward, creating two subchambers, one in front and one in back, with a particular connecting tube between them.

It is through this position of the tongue, dividing the oral cavity into two chambers, that the vowels are generally described. Viewed from the side, if the point of the tongue at which the division takes place (the highest point of the tongue) is relatively high (creating a narrow space between it and the roof of the mouth) and relatively forward, the resulting configuration of the resonance chambers creates the [i] sound as in heat. If it is still high but back in the mouth, then the [u] sound is created, as in hoot. If it is low and in a central position between front and back, then the [a] sound is created, as in hot.

By describing the position of the tongue body (the central part of the tongue that divides the oral cavity into resonance chambers), we can thus roughly describe most vowels. The height positions are usually high, mid, and low; while the depth positions are front, central, and back. Added to these are the features of the lips--round (protruded) or unrounded (slit). For example, the root vowel in German Biene [bi:nə] 'bee' is a high-front unrounded vowel, while in German Bühne [by:nə] 'stage', it is a high-front rounded vowel.

The nasal cavity also acts as a resonance chamber in the production of vowels. This cavity is easy to describe, as it is either open (the velum lowered) or closed, and there is

no articulator like the tongue to cause any variations in its configuration. When the nasal cavity is open, we have a nasal or nasalized vowel, as in French un [œ̃] 'one (masculine)' (a mid-front rounded nasal vowel); and when it is closed, we have a nonnasal (regular) vowel, as in the feminine form une [yn] (a high-front rounded vowel).

One significant aspect stands out that was generally overlooked in the segmental approach. At all times, no matter what the laryngeal activity may be and no matter what consonantal factors may come into play, there is always a vowel in production in speech.¹² On one side of the issue, there must be laryngeal activity to some degree for speech to be effected, and this means that there is vibration or noise affected by the resonance chambers. On the other side, regardless of what any other elements of the vocal apparatuses may do, they cannot erase the fact that the vocalic apparatus is creating a particular set of resonance chambers at any given time.

Viewed physiologically, this observation is even stronger. As a vowel is described in terms of the position of the tongue body, height of the jaw, and protrusion of the lips, there must always be a vowel in speech, for the tongue body must be in some position, the jaw at some height, and the lips at some degree of protrusion (including privative, or unrounded). As long as speech is being effected, then, a vowel (or semivowel) is under production and at all times present.

3.2.c The Consonantal Obstruction

Thus far, we have seen that the airstream is forced up out of the lungs and is first constrained at the larynx by the vocal cords. This constraint creates the sound--the fundamental frequency--upon which all speech sound is based. As the airstream/fundamental frequency passes into the oral and nasal cavities, these cavities act as resonance chambers and further constrain the basic sound, creating formants--concentrations of energy at certain frequencies. At this point, we have what is known as harmonic sound.

Consonants are further constraints on the airstream/harmonics, which serve to obstruct this harmonic sound. Physiologically, they are obstructions at various points through the passageway and they are realized as various degrees of obstruction. For example, a [p] (as in pen) is an obstruction at the lips that completely stops the airstream; while a [θ] (as in then) is an obstruction at the teeth that only partially stops the airstream, hindering it only so much as to bring about frication (whence the term fricative).

Acoustically, consonants are breaks, or noise in the continuous flow of harmonic sound. On the spectrogram, they appear as gaps or as clouds that allow more or less of the harmonic pattern to be seen through them, depending upon their degree of obstruction or constraint. For example, the [p] will appear as a gap in the pattern, and the [θ] as a cloud of noise. The position of obstruction can be determined from the spectrogram, even where a stop creates a

gap, by the manner in which the formants are bent. The formants are diverted momentarily toward a particular position, or locus, which can be interpolated in the case of stops by examining the pattern just before and after the gap.¹³ There are precise formulas for finding the locus and determining the position of obstruction from the spectrogram, though these are quite complex and, again, of interest only to the specialist.

As this work does concern itself with a shift in consonants, this particular aspect of the speech event will be handled in much greater detail below. It should suffice to say here that a consonant is not a sound in and of itself, but a constraint on sound. It is therefore quite impossible to utter a consonant all by itself—it must be constraining something. For example, if we utter the consonant [v] as in the word vee, we may believe we are uttering only the consonant; but if we utter the "same" consonant [v] as in the word voodoo, we hear a different sound. Indeed, it is the sound—the vowel—that is different. The labial fricative [v] is nothing more than a partial (fricative) obstruction at the lips (labial) on a vowel sound being emitted. If we remove this vowel sound, we hear nothing, as the upper teeth gently rest upon the lower lip, creating no sound whatsoever.

3.2.d Dynamic Coarticulatory Constraint

In viewing the dynamic flow of the speech event, then, we see that consonants and vowels do not follow one another

er in progressions of neat, discrete bundles of features. In uttering the word cat [k^hæt], for example, the speaker does not first utter a [k] and then an [æ] and finally a [t] in rapid succession, making sure to adjust the pronunciation of each bundle so that there is a smooth transition from one unit to the next (as one does in phonic instruction in reading). Rather, the speaker utters the vowel [æ], obstructing it initially with a total velar obstruction [k] and finally with a total dental obstruction [t].

Thus, speech is not an activity bound by the left-to-right array of letters on a page, but the layering of constraints on the airstream. As the airstream is constrained at the larynx by the vocal cords, the basic vibration or friction results in the fundamental frequency of voice (or the noise of whisper). The fundamental frequency is enhanced by the resonance chambers of the oral and nasal cavities, resulting in the vowel [æ] in the example. It is only with this sound in progress that the consonants could possibly be uttered; they are merely further constraints on the dynamic flow without the capability of sound production themselves. In this case, they cut off the utterance initially at the velum and finally at the teeth. This is the basis of the principle of dynamic coarticulatory constraint.

The principle of dynamic coarticulatory constraint holds simply that the speech event should be described in terms of the natural dynamic flow. Rather than describing speech by stringing together phones or phonemes from left to right, then, we should view speech as a hierarchy of constraints (laryngeal, vocalic/syllabic, consonantal/obstructional) on the

dynamic flow that occur not sequentially, but simultaneously with one another. As such, this view is opposed to the traditional segmental theory, which states that speech is representable in what is known as cross-sectional segmentation.¹⁴

To understand what this cross-sectional segmentation is and how it is opposed to dynamic coarticulatory constraint, let us consider the traditional problem of the German phoneme /x/. As a phoneme, this /x/ is an abstract "sound" that is realized in actual speech by one of two variants--the voiceless palatal fricative [ç] and the voiceless velar fricative [x]. The palatal allophone (that is, the palatal phonemic variant) is realized after front vowels such as that in ich [iç] 'I', and the velar allophone is realized after back vowels such as that in ach [ax] 'oh'. This is a classic example of allophonic variation, and it has been used over the past several decades in an argument over whether the two variants should be treated within the single phoneme /x/ or in two different phonemes /x/ and /ç/. In this discussion, I shall limit the environments to the noncontroversial examples, which by themselves would certainly be considered allophones by any segmental analyst.¹⁵

In the segmental analysis, the choice of the palatal or of the velar feature would rest on the presence of a front or of a back vowel, respectively. Spectrographic analysis of this dorsal fricative in a number of different environments, however, reveals that it is not simply a choice of one or another allophone. The precise position of the voiceless fricative varies in a continuum from front palatal to back velar depending upon the vowel being produced and subject

to other variables in the phonetic environment. From the point of view of dynamic coarticulatory constraint, of course, this is exactly what we would expect, for the positioning element here is the tongue body—a vocalic articulator (not a consonantal one). The precise position of articulation for the consonant is the same as the tongue-body position of the vowel and is subject to a host of variables from vowel combinations to stress, pitch, and the presence of what the segmentalist may have considered rather distant vowels. All of this makes it simply impossible to determine precise segmental rules of transition in each case, and the whole allophonic concept breaks down.

The principle of dynamic coarticulatory constraint handles the problem elegantly and simply. As noted above, the tongue-body position is not a consonantal articulator in the first place, but a vocalic one, serving to delineate the boundary between the front and back chambers in the oral cavity. The only consonantal property involved in this is the act of constricting the airstream in such a way as to cause voiceless frication at whatever point the tongue body happens to be in its ongoing production of the vowel. When we describe the event of the dynamic flow in terms of the consonantal element constraining the vowel with which it is articulated simultaneously (that is, in coarticulatory constraint), then such problems as the countless variations that the segmentalist needs to handle in the consonant itself quite simply do not exist, for the features of consonants are now attributed to consonants, and those of vowels to vowels.

The basic problem with cross-sectional segmentation, then, is that it takes the utterance and makes divisions not with regard to the types of constraints represented in the utterance, but only with regard to the features that happen to be uttered one after another. Such a practice lumps the features of the vowel in with those of the consonants and attributes them to these consonants, which is the basic fallacy of cross-sectional segmentation and can be illustrated as in figure 3-1.

In figure 3-1, the box represents the actual utterance, in this case the name Bach [bax]. In actual dynamic pronunciation, represented in the figure by the lines coming from the top, this word maintains the long low-central vowel [a] throughout the syllable, with the voiced labial stop [b] coarticulated with it and constraining it initially and the voiceless (dorsal) fricative [x] coarticulated with it and constraining it finally. Thus, the consonants and vowels overlap. In cross-sectional segmentation, however, as represented in the figure by the lines below the box, the box is cut up into three segments, the first includes the consonant [b] and the initial portion of the vowel, the second includes the pure unobstructed vowel sound [a], and the third the consonant [x]. It should be rather obvious that cross-sectional segmentation ends up attributing characteristic features of the vowel to the consonant, and this leads to faulty analyses (such as the allophones of /x/).

We may well ask why segmental analysts have not come to the realization that speech is uttered in keeping with the principle of dynamic coarticulatory constraint. The fact is

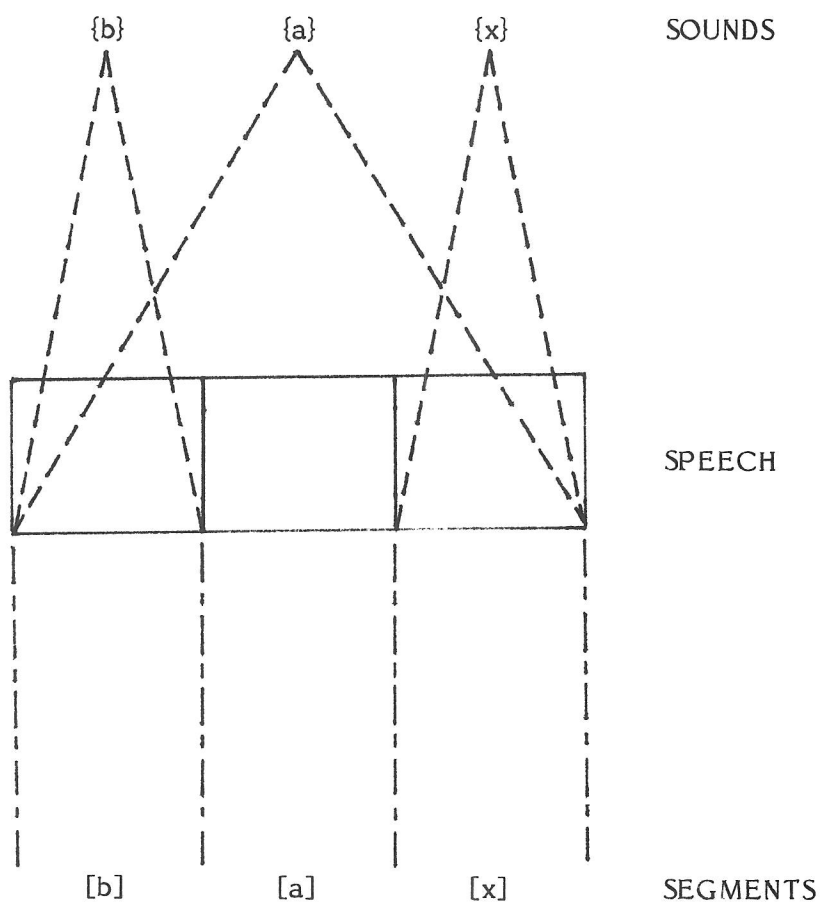


Fig. 3-1. Segmentation of the speech continuum

that most segmentalists are fully aware of this principle (it is, after all, quite broadly covered in experimental phonetics). Indeed, figure 3-1 is adapted from a segmentalist article on developing a more adequate method of representing speech. Rather than simply use the natural framework that this principle suggests, segmentalists prefer to use the evidence from dynamic phonetics to find ways of making better segments.¹⁶

Now a deeper question may be posed: Why, if the dynamic flow of speech is nonsegmental in nature, are segmentalists persistent in trying to refine segments rather than trying to find a direct representation of the dynamic continuum itself? There are two fairly substantial reasons for an adherence to the segment in one form or another.

The first reason takes into consideration that dynamic analysis has been used for only a few decades, while segmental analysis has been going on for centuries in the form of alphabetic writing. We ought once again to remember the history of linguistics as it relates to the development of the sound law. All of the researchers up to and including Jacob Grimm worked entirely with letters--cross-sectionally segmented speech in neat left-to-right representation. With the new generations of linguists following Karl Verner, phonetic representation may have supplanted the traditional orthography, but this representation was still in the form of phonetic letters. Even with modern feature analysis, most schools have lumped the features together into segments that still adhere to the boundaries of letters (regardless of how they may be written in algebraic formulas).¹⁷ While

other schools have gone a long way toward freeing the features from their phonemic letters, vestiges still remain and still cause problems with analysis and description.¹⁸

The first reason for the persistence of segmentation in linguistics goes back to the old notion that written language is primary and spoken language is secondary. While such a suggestion may well grate on the nerves of the phonologist, there is considerable foundation for it. After all, what is analyzed in segmental descriptions is not speech itself, nor is it the features of speech, which have been so well isolated and treated in experimental phonetics. What is analyzed in segmental description are the segments themselves--the letters of the phonologist. And where the dynamic evidence points to problems in the foundations of segmental theory, the segmental phonologist tries to use this evidence not to build stronger foundations, but to patch up the façade as cracks appear.

To be kinder to the segmental analyst, however, we must also point out the second reason why segmental theory persists. That is that there has been no viable alternative derived directly from the evidence of dynamic phonetic analysis. While there are less-segmental means of analysis (such as the prosodic analysis of the London School), these have developed independently of the latest dynamic evidence, and most linguists (especially in America) are sadly unfamiliar with them anyway. In the following section, I present a relatively new application of the principle of dynamic coarticulatory constraint in keeping with the latest experimental phonetic findings.

3.3 DYNAMIC PHONOLOGY

The viable alternative to segmental theory offered here is the model of dynamic phonology. It should be emphasized that this is in itself not a new theory, but rather an application of dynamic phonetics to the traditional structural/functional theories of linguistics. In effect, it is a pragmatic intersection of two sets of theories—one of phonetics and one of phonology.¹⁹

3.3.a The Hierarchical Model

The basic relationships among the various features traditionally associated with sounds are organized along the lines of the speech event in keeping with the principle of dynamic coarticulatory constraint in this model. Thus, the laryngeal features produced in the initial constraint of the airstream and the establishment of the fundamental frequency are grouped together as elements of the laryngeal division, as illustrated in figure 3-2. These include whatever degrees of voice may be pertinent (may be used in communication) in a language. In most cases, though, there are only three features: voice, whisper, and their privation (or no speech at all—a degree useful in considering phenomena at the end of utterances). As voice and whisper (and the privative) are degrees along a single phonetic parameter and cannot be uttered simultaneously, we may consider them to be in opposition along this parameter.²⁰ They are, therefore, members

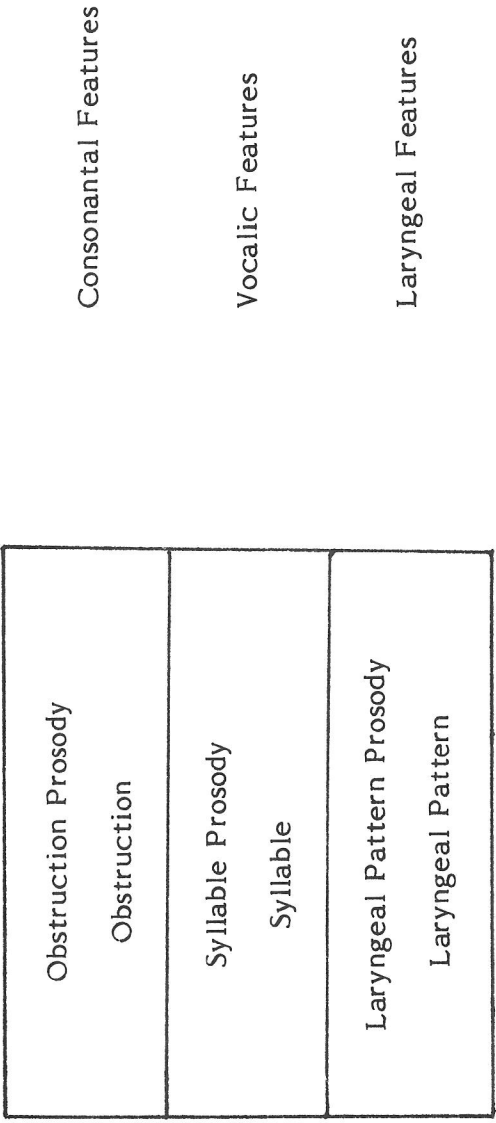


Fig. 3-2. Hierarchical model

of the opposition of phonation, and this opposition is taken to be the basic or main opposition of the division--the product of the primary speech function of the larynx. (Here, an opposition is the phonological relationship among two or more features in the same parameter--for example, voice and voicelessness are opposed within the parameter of voice.)

This division may contain other features as well, features which are finer applications of the physiological and acoustic characteristics of the laryngeal division. To differentiate between the main division feature and these finer features, the latter may be called prosodies. Most prominently, these include intonational stress and pitch (the heavy beat and the rise and fall of the voice, respectively), which derive from more precise control of the larynx in its constraint of the airstream coming up from the lungs. Each of these, of course, is also an opposition with several members; for example, stress and pitch may have three or four degrees each, and each degree is a member of its respective opposition. The features of the laryngeal division occur throughout speech (that is, beyond the syllable or word) in the pattern of rising and falling stress and pitch, traditionally known as intonation.

The next higher division in the hierarchy of constraint is the syllable division. This is the realm of the vocalic features, which are also arranged in opposition. In most languages, the main syllable division oppositions include height (the height of the tongue body--high, mid, low), depth (the frontness of the tongue body--front, central, back), and

sometimes roundedness (the protrusion of the lips--round, unrounded). There must always be some member or some movement between members, regardless of the laryngeal feature, for the tongue body must always be in some position, even during the transition from speech to breathing.

Within this division, the syllable prosodies include (among others) nasality and the laryngeal oppositions stress and pitch. In this case and in general, when the features of a constrained division are used within a constraining division, they are realized to a heightened degree because they are added to one another. For example, if in the utterance of a sentence, a speaker places heavy intonational stress on a word (more precisely on the stressed syllable of that word), then the syllable stress realized in the affected position is added on top of the heavy intonational stress. This heightened realization of stress is necessary in communication to enable the listener to recognize the word within the sentence. What sets the syllable prosodies of stress and pitch apart from their corresponding laryngeal prosodies is their restriction to the syllable, a restriction treated in section 3.3.b.

The final division in the model of relationships is the obstruction division, containing the consonantal features arranged in opposition. As the primary function of this division is to obstruct or constrain the dynamic flow of speech in a characteristic position (creating a characteristic locus acoustically), the main obstruction-division opposition is a parameter of position, usually arrayed from front to back. The position of obstruction must also take into consideration

the configuration of the articulator, as this aspect of obstruction can have a great and pertinent effect. Thus, for example, we find basic members including labial (obstruction at the lips), dental (at the tongue or alveolum), dorsal (at the back of the tongue, from palatal to velar--and these are separate in some languages), as well as configurational members such as slit ([s]), grooved ([ʃ]), retroflex (American English [ɾ]), lateral ([l]), and so forth.

The obstruction itself is realized at each position to various degrees, from total obstruction (the stop, plosive, or occlusive), through partial obstruction (the fricative), to slight obstruction (the liquid); and these degrees are handled prosodically. These degrees may be determined by other prosodies as we shall see farther on. Among the other obstruction prosodies are included those traditionally associated with manner of articulation--nasality, aspiration, voice, and so on. Once again, the obstructional realization of, for instance, voice will be realized in speech to a heightened degree over the phonational voice and the voice as it is realized in the syllable.

Thus, we arrange the features of speech into oppositions within the framework suggested by the dynamic flow of the speech event itself. This heirarchy of constraint faithfully represents the application of the principle of dynamic coarticulatory constraint to the features (as members of oppositions) of speech. When we view the whole picture, however, we gain some appreciation for the apprehension of segmental analysts to use the dynamic relationships in actual analysis. While the segments of the old letter-based approach may

have retained the notion of the primacy of written language and may also have been downright unworkable owing to the problems with cross-sectional segmentation, we could nonetheless make use of letters in analysis. Analysis cannot be performed without some way of organizing the features in this vast array of constraint. The organizational unit of dynamic phonology, though, is also suggested by the speech event--the syllable.

3.3.b The Syllabic Frame

The syllable is the smallest unit in the dynamic flow of speech that can be segmented within this continuous flow.²¹ Consequently, while speech cannot adequately be treated as the stringing together of letter-sized units in neat progression and with transition rules linking them, it can quite adequately be treated as the stringing together of syllable-sized units. The syllable gives us an organizational unit that is both small enough to be workable (as opposed to whole words, phrases, or sentences, which would be practically impossible to use for the isolation and description of phonetic features) and consistent enough to provide a single framework (rather than a host of variants).

Within the syllable, the core of this frame must be the vocalic features. Viewed dynamically, a syllable is most consistently described as a steady-state vowel emission or at least an approximation of one. This means that when in speech the tongue body, lips, and jaw (the vocalic articulators) come to rest or to deliberate, patterned movement

from one position to another, a vowel is produced, and this vowel is the mark of a syllable. The vowels acceptable in any language are limited in number to those vowels and vowels of movement (such as diphthongs) that function to communicate (for example, the random utterance of a front rounded vowel in English would not be pertinent).

Taking the vocalic emission to be the core syllabic event is by no means random. From one direction of the hierarchy of constraint, the laryngeal activity operates over the entire utterance and is not divisible into syllable-sized units. From the other direction, the consonantal obstructions are far too narrow--their use as the basis of a descriptive and analytical unit would preclude the vowels they constrain. Moreover, no syllable can be uttered without a vowel (static or in motion), and a vowel can be uttered without a consonant.

The consistent, single framework used for the organization of features into their positions within the syllable is provided by the syllabic frame, illustrated in figure 3-3. Above all, this syllabic frame must be flexible--it is only a device used by the linguist to organize features into their relationships within the syllable, and it is not the syllable itself. The jagged lines at every boundary represent the fact that features are realized in greatly varying ranges. For example, the nasal prosody associated with the final obstruction in the English monosyllable pin [pin] often begins well into the preceding vowel, such that in a precise (narrow) description that portion of the obstructional "box" may jut out all the way to the initial obstruction. Indeed,

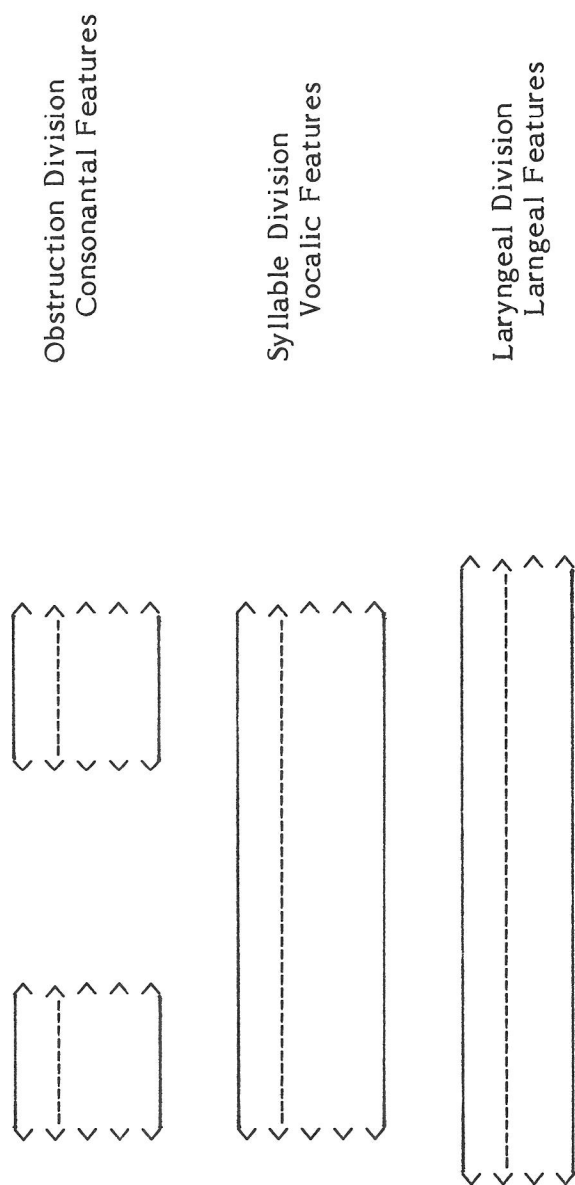


Fig. 3-3. Syllabic frame

the two obstruction positions often meet in the production of "syllabic" consonants, such as the one in the second syllable of English little [lit-tl̩].

Of course, there is nothing limiting the initial or the final obstruction position to only one obstruction each. Clusters may consist of several individual obstructions in sequence (as in English whilst [wɪl̩st]) or simultaneously (as in German zwei, represented by the segmental notation [tsvai], though the obstructional articulators are actually in position for all three at once). On the other hand, there is no requirement that there be an obstruction in every syllable.

A great many of the pitfalls of segmentation are avoided by attributing the features (in opposition within single phonetic parameters) to their proper places within the syllabic frame. For example, let us reconsider the case of German ich [iç] 'I' and ach [ax] 'oh', introduced in section 3.2.d. As the situation was described before in segmental terms, the voiceless dorsal fricative was seen as having two variants--palatal [ç] after a front vowel, and velar [x] after a back vowel. From the dynamic phonetic evidence, however, such an arrangement was unworkable, for the precise position of the tongue body in the "production" of the consonant was dependent upon the practically innumerable variations effected in the production of the syllabic vowel and its coarticulation with the laryngeal prosodies.

There is no room for such an error when we shift from using the letter in segmental analysis to using the syllabic frame in dynamic analysis. Building the frame from the bottom, we would include in the laryngeal division any

intonational feature that might be heard during the production of the syllable and particularly during the consonantal obstruction. We then add the features of the syllable division, the core of the syllable itself. In the production of ich, these features would include the high and the front tongue-body position; and in the production of ach, they would include the low and the central tongue-body position. With these vocalic features properly accounted for in the syllable division, there is no need nor is there any proper reason to include them in the final obstruction position. In that portion of the obstruction division, the pertinent features would include partial closure (frication) and the suppression of voice (voicelessness or whisper).

The syllabic frame, then, is a useful device in description and analysis. It provides us with a framework for placing the various features, so that each and every pertinent feature is assigned to its proper position (there are none left over) and no feature is out of place (either by misplacement or by double placement). With such a device, we can account for the features of speech in the most natural manner possible, in keeping with the principle of dynamic coarticulatory constraint and with all of the evidence from modern experimental phonetics.

Moreover, if we examine the syllabic frame along with the representation of a syllable on the spectrogram, the similarity should be quite striking. While this particular similarity is fortuitous, it can nonetheless be useful to the analysts who could conceivably be aided in the assignment of features by placing a transparency of the syllabic frame

over the spectrogram. We may well expect someday to develop ways of automatically isolating and identifying features on the spectrogram and assigning them to the syllabic frame as techniques and machinery for spectrographic analysis improve. The task for the phonologist then would simply be to eliminate the features that do not serve a function in language (that do not directly contribute to communication).

The syllabic frame is thus a far more reliable device for description and analysis in linguistics than is the discrete segment. Through it, the researcher can finally examine language in its primary mode--in speech rather than in writing--for the syllabic frame is the representation of the speech unit and not the representation of a written unit (such as the letter, be it orthographic or "phonetic"). In fact, I would go so far as to suggest that in as many instances as possible, the frame be used only as a simple reference for analysis (as it is used in the treatment of the German example above), and that it rarely be filled in, except where this is needed to illustrate a particular point (and then in terms no more specific than necessary).²²

The reason for this stricture is twofold. First of all, if all frames were filled in to their capacity in a given language, the total would most certainly be taken for an inventory of the language's syllables. This would be a grave mistake, for the basic inventory unit of speech must remain the feature, with the syllable the basic organizational unit.²³ Confusing the two and allowing for syllable inventories would lead to a repetition of some of the mistakes of

segmental theory (most notably those of the phonemic schools).

The second reason is more pertinent to the topic of this work and once again harkens back to the old notion of the primacy of writing. The use of writing as the primary expression of language long misled researchers in their determinations of Indo-European language relationships and indeed in many other matters as well (for example, the use of a single letter contributes much to the segmental confusions in the ich-ach problem above). While the use of the syllabic frame is much closer to speech than is the use of letters, the writing of all pertinent information into the frame on paper would direct the analyst's attention away from sound and once again toward something written. The consequent danger that abstract, algebraic formulas would be constructed on the basis of this writing and that these formulas would become the primary object of investigation is quite simply too great.

Nor should we look at the syllabic frame as offering a new and more reliable form of writing for everyday use. While it does more faithfully represent the sound uttered in the dynamic flow of speech, this representation is not the primary purpose of writing. Writing is a method of transmitting information from one person to another over extended space and time. Alphabets, syllabaries, and ideographs commonly in use do this quite well and much more efficiently than any writing system based solely on the precise representation of the speech event itself.

CHAPTER 4

NEW SOUND LAWS: THE INDO-EUROPEAN SOUND SHIFT

Now that we have established the new phonetic and phonological bases for our investigation of the sound laws relating Germanic with the rest of the Indo-European language family, we can proceed with the actual investigation. This investigation must take place in two stages: First, the phonetic features and relationships that underlie the sound changes (as seen in their correspondences) must be precisely determined; and second, the new sound laws must be formulated as faithfully to these determinations as possible.

4.1 THE FORTIS-LENIS SCALE

Throughout this work, I have described the correspondences involved in the shift (whichever direction it may have taken) as occurring along the traditional fortis-lenis scale and have even gone so far as to use such terms as aspiration, tension, or aspirate tension in connection with this scale. Moreover, a strengthening along this scale (a change from lenis to fortis) has been termed provection, and a

weakening (the opposite change) has been termed lenition.

4.1.a Traditional Problems

While aspiration, tension, provection, and lenition are traditionally recognized concepts and terms, there is a major problem in using them. The problem stems from the use of these concepts and terms in the traditional letter-based or segmental systems. At first, when phonetic justification was not required for sound laws and indeed for phonology in general, the fortis-lenis scale made a great deal of sense if only for the reason that such changes as those of the shift (and many others among Indo-European languages) quite obviously and incontrovertibly took place along the parameter of the scale.¹ As the scientific basis for phonology took root, however, and actual physiological and acoustic evidence was required for any phonological relationship, linguists came to the uneasy realization that they could find no single phonetic parameter that would allow for the consistent changes along the scale--no single phonetic characteristic that would account for a change from [t̪] to [d], from [d] to [t], and from [t] to [θ].²

At the root of this quandary lay two prominent shortcomings of phonetics and phonology. First, the speech continuum was divided into segments, with the attendant drawbacks described in the previous chapter. Second, the features of these segmental units (these bundles of features) came to be viewed as having only two values--they were either present or absent, marked or unmarked, strong or

weak, or in the most current terminology plus or minus.

The development of binary features in segmental phonology came about for several reasons. In the 1950s, technology was coming of age, and with it came information sciences and binary logic. Just as linguistics had borrowed concepts from the natural sciences in the nineteenth century in an effort to make linguistic analysis more scientific (and more reliable), it now borrowed the binary logic underlying much of twentieth-century scientific thought (or at least its representation).³

Binary features appeared to fit into the concept of the operation of the brain, the locus of language. It could be argued that the brain either gave a command or it did not—it either fired a neuron or it did not. As features made up segments, it was believed that the building up of a segment was accomplished by the brain giving the appropriate orders for the inclusion (or exclusion) of particular features at a particular time. Of course the obvious drawbacks (obvious to those looking back over thirty years) are that speech is not made up of segments composed of features bundled together, nor is the organization of the brain so simple in operation (rather, it is an extremely complex network).⁴

Binary features could represent the segments of speech in a single relationship. Such linguists as Nikolai Trubetzkoy had allowed for privative oppositions (or correlations) with two features/members as well as for gradual oppositions with more, and these latter oppositions could take care of a scale quite directly. Following Trubetzkoy's colleague Roman Jakobson, however, most phonologists abandoned the

gradual opposition (the many-valued feature) in favor of the privative opposition (the binary feature). The proponents of binary features pointed out that [ɸ] was related to [d] through frication, [d] was related to [t] through voice, and [t] was related to [θ] through (voiceless) frication; thus, the features could be used in such a way as to account for gradual scales through the binary feature, a single relationship built upon two or more parameters in the prevailing logic and the scientific assumptions of the day.⁵

Phonologists could in no way find a single phonetic parameter that would relate the various members of the fortis-lenis scale by using binary features. To handle the three Germanic members (for example [d], [t], [θ]) and the three non-Germanic ([ɸ] or [ɖ]—the underline designates murmur—, [d], [t], respectively), a linguist would need four separate members involved in a single gradual progression, where the current theory would allow only two at a time (two in a single feature relationship, or parameter).

On the other hand, while much pressure was brought to bear on phoneticians to force their findings into binary relationships and indeed into the types of abstract formulas used in phonology, the very nature of phonetic investigation made it possible to see gradual relationships among segments in experimental evidence. Nonetheless, the evidence was in fact segmental, and the segment was just as great a hindrance to the determination of a phonetic justification of the fortis-lenis scale as was the binary feature.

Such linguists as James Foley,⁶ working with gradual features rather than binary, still conclude that there is no

phonetic justification for the fortis-lenis scale. Foley, however, is working within an "outer approach" view of phonology--that phonology is a psychologically based phenomenon, in which a change from [d] to [t] is viewed as a change in the speaker's linguistic structure in the brain, which simply happens to be represented then in the phonetics of speech. Consequently, the fortis-lenis scale in such a paradigm is a phonological feature without phonetic basis (though it has ultimate phonetic ramifications).

Most phonologists and certainly nearly all phoneticians would adhere to the "inner approach" view (in which change occurs as the result of a phonetic speech sound that is for one reason or another reinterpreted), and they would take issue with the concept that sound change occurs first in the linguistic structure of the brain. Nonetheless, the inability to find a single phonetic parameter that would account for the gradual opposition involved in the fortis-lenis scale has led such phoneticians as Theo Vennemann and Peter Ladefoged to the uneasy conclusion that this scale must indeed represent some form of phonological feature relationship independent of the phonetic substance making it up.⁷

The fortis-lenis scale, then, has been a major stumbling block in segmental phonetics and phonology. Without a clear understanding of its phonetic substance (if any), we can neither effectively argue for one direction or the other in the sound shift in question on the basis of phonetic cause nor even conclude that a shift along the scale is possible. Of course, we know it is possible, for it has occurred (and not infrequently in the world's languages), and this leads us

to conclude that there must be some justification for it--a justification which has eluded segmental research.

4.1.b Dynamic Phonetic Justification

To find out what the phonetic justification for the fortis-lenis scale is and thereby to find out how the shift took place, we need to abandon the segment and look at the evidence from a dynamic, nonsegmental perspective. This entails first returning to the speech event, the series of constraints on the airstream (section 3.2), and examining the possibilities in the light of the relationship among the four members of the fortis-lenis scale that characterized the Indo-European and Germanic systems at the time of the shift. In this single relationship that serves to differentiate one column from its adjacent column(s) in figure 1-3, the same phonetic characteristic must account for the difference between [ɸ] (or [v] or [b̥]) and [b], between [b] and [p], and between [p] and [f]; as it must account for the same difference between [ɸ] (or [d̥]) and [d], between [d] and [t], and between [t] and [θ]; as well as for the difference between [g] (or [g̥]) and [g], between [g] and [k], and between [k] and [x] (and many would add [g^w] or [g̥^w], [g^w], [k^w], [x^w], though for our purposes such a relationship would be subsumed under the dorsal).

Because we are dealing here with relationships among the various degrees and positions of obstruction, segmental phonologists would traditionally examine the substance of the consonants themselves, finding relationships of frication

and voice, but no common single factor. On the other hand, if we view the situation dynamically, we should arrive at the conclusion that the phonetic characteristic that serves to relate these degrees and positions cannot be inherent to the obstruction division at all.

The reason the phonetic characteristic involved cannot be found in the obstruction division (and hence the reason it has eluded segmentalists) derives from the fortis-lenis scale's very regularity at all positions. Indeed, if we were to consider all of the many positional "allophones" that could be added (such as palatal [ç] in addition to velar [x]—see section 3.4), we would find that the common relationship would still be exactly the same. The characteristic underlying the fortis-lenis relationship is therefore something more general than the position, which in the dynamic model accounts for the main obstruction-division opposition.

The absence of a common characteristic in the main obstruction opposition leads us to consider the obstruction prosodies. Again, however, any prosody involved cannot be tied to the positioning of the obstruction itself (that is, it cannot involve finer applications of the characteristics of the obstruction division itself), because the feature we are looking for is more general than position. This narrows the choice down to those feature characteristics that are used in the obstruction division but derive from the syllable or laryngeal division. Moreover, all of those that are applicable as obstruction prosodies in fact ultimately derive from the laryngeal division; so here is where we should look.

Examining the activity of the larynx at the time of

obstruction reveals many different possibilities. Only one, however, matches the precise scale of relationships found among the consonants involved in the shift. In a cineradiographic investigation, Joseph Perkell made extensive recordings throughout the vocal apparatuses and found an interesting phenomenon occurring at the opening, or orifice of the larynx.⁸ In the production of the nonsense words [hɛ'zɛ], [hɛ'dɛ], [hɛ'tɛ], and [hɛ'sɛ], in which the scale [z], [d], [t], [s] quite acceptably fits into the fortis-lenis scale in question, there was a remarkably regular increase in the width of the larynx seventy-five milliseconds before the release of the consonant. Here, then, is where we find a laryngeal characteristic that progresses regularly from lenis to fortis along the scale.

It is all very nice to refer to a widening of the orifice of the larynx, but what does it mean? It means basically that there is an increase in air pressure building up in the larynx just prior to the utterance of the consonant. As the consonant is released, so is the air, and this increase in air is added to the airstream all the way through the dynamic event. At higher levels, this pressure is enough to prohibit voicing; so the lower degrees on the scale are voiced, but the higher are voiceless.

We find an even more precise indication about what this phonetic feature really is in the constraint of voice. As noted above in section 3.2.a, at the opposite end of the main laryngeal division opposition from voice is whisper--the higher degrees along the fortis-lenis scale are in effect whispered. This whisper is realized in the obstruction divi-

sion as the prosody of aspiration.

Important corroboration for this determination, that aspiration is the underlying relationship that ties the fortis-lenis scale together, comes from the evidence of Leigh Lisker and Arthur Abramson that the voicing associated with the vowel and momentarily obstructed by the consonant is delayed progressively longer as we go up the scale from lenis to fortis.⁹ This delay in voicing, or the increase in the constraint of voicing, would correspond to an increase in the level or amount of aspiration. There are quite a few other bits of evidence that corroborate the finding that the basis of this particular fortis-lenis scale is to be found in aspiration.¹⁰ Inasmuch as the fortis-lenis scale is also known as the scale of tension, we may wish to be more specific and refer to aspiration in this particular usage as aspirate tension.

On the acoustic side of the investigation, we come to precisely the same conclusion. In a spectrographic examination of the nonsense words [~~dahad~~], [dahad], [tahat], and [~~QahaQ~~] (sticking more closely to the precise scale of the shift), this researcher found that there is a gradual increase in high-to-low energy concentrations as we go up the scale from lenis to fortis. That is, in the more lenis consonants, the more intense energy shown on the spectrogram is at lower frequency levels; and as the degree along the fortis-lenis scale increases, the sounds are produced with more and more of their energy shifting up to higher frequencies.¹¹

All of this may seem a bit confusing, until we recall the relationship among the three divisions and how they relate

to sound energy as represented on the spectrogram. The fundamental frequency from the larynx is enhanced with formants by the vowels, and the first (lowest) two formants are most important in the determination of vowel sounds. Although higher formants are often important as well, the higher the formant is, the further it is in frequency from the fundamental frequency, and the less associated it is with the vowel (or with the laryngeal activity). Characteristically, the higher energy levels are the domain of consonantal obstruction and, more pertinently, of aspirate noise.

In the progression from lenis to fortis, then, the gradual changes in the spectrogram are precisely what we would expect from a gradual increase in the degree of aspiration. Increasingly, high-frequency aspirate noise comes to constrain low-frequency voicing. This is what is meant by an increasing high-to-low frequency energy ratio, and together with the cineradiographic evidence it provides strong supporting evidence for the feature aspiration, or aspirate tension as the phonetic characteristic underlying the single common relationship among the degrees of the fortis-lenis scale.

Thus, when we examine the evidence from the dynamic point of view, treating the speech event as a series of coarticulated constraints rather than as discrete progressions of feature bundles or letters, we indeed find that the phonetic characteristic underlying the fortis-lenis scale is aspiration (or aspirate tension). This is not simply the aspiration that we recognize as the puff of air coming directly after the p in pot (as opposed to the unaspirated p in spot), although

this manifestation of aspiration is certainly within the system and helps to differentiate between *tenuis* and *aspirata*. In more general terms, though, aspiration is the buildup and release of air in the larynx, which is realized acoustically as high-frequency noise obstructing voicing.

4.2 ASPIRATION IN THE SYLLABIC FRAME

Now that we know what the phonetic basis is for the fortis-lenis scale along which the shift took place, we should determine how this phonetic feature aspiration affects the dynamics of the syllabic frame. Sound laws, after all, should be descriptions of the manner in which natural phonetic pressures bring about predictable change—not statements arbitrarily assigning conservatism to one sound and innovation to another without respect to the phonetic evidence.

4.2.a Consonant-Vowel Relationships

To determine the phonetic pressures at work, we should first recognize how the feature/opposition aspiration fits into the phonological system. In this respect, one of the most important aspects of this aspirate tension is that, while it is primarily a characteristic of the laryngeal division, as it is used in the obstruction division it is to a large degree the very essence of being a consonant, of the obstructive portion of the speech event. This obstructive aspect has in fact been recognized traditionally (though not isolated

phonetically) as seen in the very terms used--*fortis* meaning strong or tense, *lenis* meaning weak or lax. This consonantal strength is no doubt what Antoine Meillet had in mind when he noted that in lenition "intervocalic consonants undergo the influence of neighboring vowels and thus [are] made like them by becoming voiced or by losing a part of their closure" (see section 2.5.a).

In coming to some appreciation for the interaction between the feature aspiration and the syllabic frame, we should review the nature of consonants and vowels in the dynamic speech event. After all, this feature (in its gradations along the scale, or opposition) plays such an important role in establishing the degree of "consonantness."¹² Within the dynamic event, then, a vowel consists of a particular set of positions or configurations of the tongue body, the lips (in protrusion), and the jaw. These positions work together to create peculiar resonance chambers, which impose upon the fundamental frequency (the laryngeal activity) particular patterns of formant frequencies. While the higher formants may play some auxiliary role in the determination of vowel sounds, it is the lower formants that serve most directly to define the vowel. We may think of the vowel thus as a low-frequency entity.

On the other hand, an obstruction consists of some degree of stoppage or hindrance to the airstream (vibrations) that has already taken on the values of the vowel, even if these values are in motion (as among English vowels, which shift from the rest position to a target area and back within a single syllable). The particular position or configuration of

the obstructing articulators and the degree to which they obstruct the vowel work to disrupt the clear, even formants of the vowel. When we examine this disruption on the spectrogram, we find that it involves noise predominantly at frequencies higher than those first two formants that are so important to the perception of the vowel—the higher the frequency concentrations involved in the disruption, the higher the degree of aspirate constraint (the more fortis the consonant).

Let us now consider the condition in which the consonant is produced "between vowels" (in "intervocalic" position). Consonants do not interrupt a string of vowels in neat progressions of discrete bundles of features in the dynamic framework; rather, they are produced simultaneously with the vowels and constrain them. This position of a consonant is thus more accurately represented in figure 4-1 (though I shall maintain the term *intervocalic* simply for convenience and for the sake of clarity). The consonant is imposed upon an ongoing vocalic emission in this situation--the vowels are produced in a continuous pattern, and the consonant is imposed upon a point in the pattern in which one vowel is shifting to another (physiologically, in the position of the vocalic apparatuses; acoustically, in the transition between formant patterns).

This intervocalic situation, in which the consonant is imposed upon an ongoing vowel pattern, is quite different from the situation of initial position, as illustrated in figure 4-2. The consonant is put into its configuration during the pause that precedes the initial syllable of a word. Although

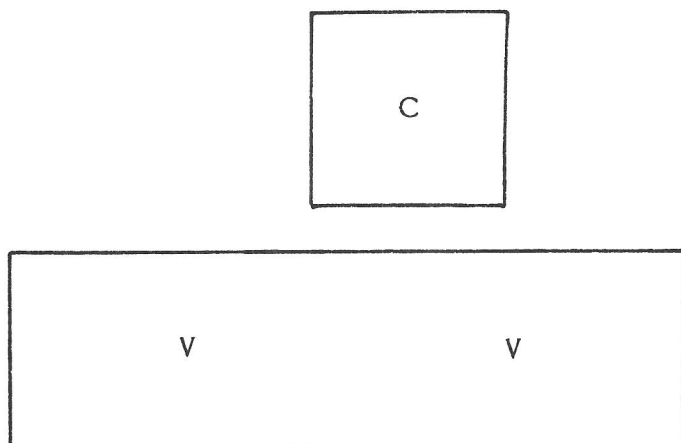


Fig. 4-1. Intervocalic Position

the consonant cannot be produced before its syllabic vowel is begun, the obstructive apparatus is already in place before it has anything to obstruct. Quite contrary to the situation in figure 4-1, then, to some degree the vowel here must overcome the obstructive consonant in initial position.

It is precisely in this difference in the interaction of consonant and vowel between intervocalic and initial position that we see the effect of aspiration on the syllabic frame most clearly. This difference holds the key for finding the root cause of the shift and hence its proper direction. Intervocalic position requires that the consonant overcome the ongoing vocalic continuum, while initial position requires that the vowel (to a much lower degree) overcome the obstruction already in place. We should expect, then, that be-

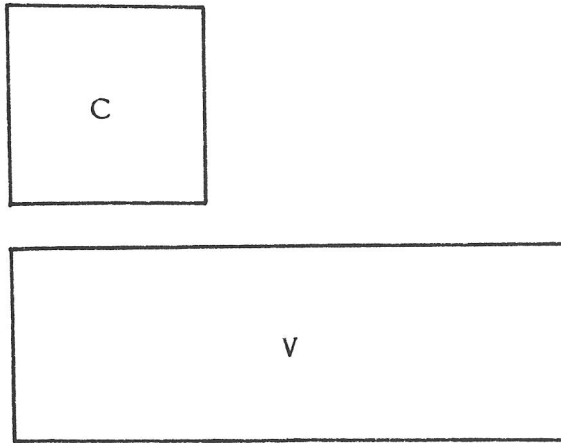


Fig. 4-2. Initial Position

tween consonants (obstructions) imposed with equal force (relative to the vowel they obstruct), the intervocalic consonant must necessarily be perceived as weaker than the initial consonant.

This can perhaps be seen more clearly in acoustic terms. In intervocalic position, the high frequency emissions of the consonant are initiated while the low frequency vocalic emissions are in progress and therefore more prominent. These high-frequency consonantal emissions are initiated from a pause in initial position, with no ongoing vocalic emission--in fact, in the cases of the tenuis and aspirata, no frequency energy information that might fix the precise nature of the vowel is perceived until after the consonant is released (although at that point--the consonant-vowel transi-

tion—it is still through coarticulatory effects that consonantal information is imparted). It is thus quite natural that as the degree of aspirate tension is determined by a ratio of high-to-low frequency energy emission, the intervocalic situation would be inherently the weaker, for it would be produced with more lower frequency sound in competition with the high-frequency consonant.

Examples of intervocalic weakening occur throughout the literature. One of the most interesting of such cases can be found in Spanish. In the development from Latin to Spanish, Latin vita 'life' with an intervocalic tenuis became Spanish vida with an intervocalic media. While this is still how the word is spelled, it has come to be pronounced in Modern Spanish as [vida] with an intervocalic susurrata (voiced fricative). Thus, we see the progressive weakening through three degrees in intervocalic position.

Much the same situation can be found in final position. Here, too, the consonant is imposed upon ongoing vocalic emission and must therefore be subject to the perception of relative weakening along the aspirate fortis-lenis scale. For example, Welsh borrowed the Latin name David with a final media. Eventually however, this media weakened to the corresponding susurrata in Dafydd [daviɖ] and ultimately to the weakest degree of all—no obstruction—in Davy.

In initial position, however, the situation is quite different. This position is not as strong as intervocalic (and final) position is weak. That is to say that we do not find as many instances of initial strengthening as there are instances of intervocalic weakening. Nonetheless, under cer-

tain conditions strengthening does occur. These conditions are actually found within the word--where stress has shifted to some internal syllable in an aspirate system. Under these conditions, the shift in stress brings about a change in the pattern and in effect makes this newly stressed syllable act as an initial syllable, as though initiated after a pause. Thus, in an aspirate system we may find the type of "spontaneous" aspiration as that found in the Welsh alternation between brenin ['brenin] 'king' and brenhines [bren'hines] 'queen'. When this aspiration occurs after one of the consonants that enter into the scale, a strengthening change may take place, as found in the alternation between pysgodyn [pəs'godɪn] 'fish' and pysgota [pəsgo't^ha] 'to fish' (Welsh has no tenuis, so the media shifts directly to the aspirata). (This type of aspirate change is treated further in section 4.2.b.)

4.2.b Prosodic Provection

As the shift of stress under such circumstances brings about an environment of heightened aspiration and thence strengthening along the scale, there are also other factors in an aspirate-tension system that will bring about this provector strengthening.¹³ One of them is simply the outright addition of aspiration in the form of glottal frication (the traditional puff of breath associated with aspirated stops or the glottal fricative [h]). For example, in the development of the Welsh language, ad 'again' has combined with heb 'quoth' to form ateb 'answer', with the appropriate aspirata formed from the combination of media and glottal

frication.

In addition to this aspirate provection, there is also a slightly more complicated geminate provection. In an aspirate system, when homorganic consonants (such as [d]+[d]) come together in a single syllable-initial position, the positions themselves may ultimately be realized simply as the single appropriate position (after a period in which they may be realized as double or long obstructions). Their degrees of aspiration, however, join (or coalesce) in a way that heightens the aspirate constraint and is realized as the aspiration associated with the next higher degree along the aspirate fortis-lenis scale. Thus, for example, the degrees of aspiration associated with the double consonant in Latin litteras 'letter' joined to produce the degree associated with the next higher member of the scale in Welsh llythyr [l^hɪθɪr], as the dental obstructions in the two positions in the Latin word merged into a single position in the Welsh word.

While the t's were aspirated in Welsh just before being proved and we could thus visualize the aspiration as puffs of breath being joined in intensity, the same thing has happened all the way down the scale. For example, Welsh gwastad 'flat' has combined with dir 'land (soft mutation)' to yield gwastatir 'plain'. Once again, then, we should bear in mind that aspiration is more than the simple puff of breath heard after the p in pot (but not after the p in spot). Whether we actually hear the breath or not, the widening of the orifice of the larynx and the increasing ratio of high-to-low frequency energy reveal that this increasing air (pressure) is there.

Aspirate and geminate provection bear one crucial resemblance to the provection brought about by the shift in stress (from section 4.2.a). Aspirate tension is increased in a syllable-initial position, and this increase and a degree of aspiration--often the aspiration associated with glottal frication--can be correlated. Aspirate and geminate provection, though, are highly marked by outright strengthening along the fortis-lenis scale due to directly applied aspiration, and they are less marked by the interaction between the obstruction division and the syllable division in the syllabic frame.

Perhaps the most revealing evidence for the relative strength between this interaction of consonant and vowel in the syllabic frame and the outright strengthening found in geminate provection can be found in the High German sound shift.¹⁴ Comparing New High German Pfeffer with its English cognate pepper, we see that geminate provection brought about a change from the aspiratae pp all the way to the spirans (still written as a geminate). On the other hand, while initial position did indeed act as a position of provective strength, it was sufficient only to increase the aspirata p to the affricate pf. This affricate represented a new degree halfway between [p] and [f] in the system, for the provective strength of initial position was not intense enough to produce the next established degree. Of course, it was intense enough to proceed past the previous degree. This distinction will prove quite important in the development of the shift in the next section.

In summary to this point, we have seen that the fortis-

lenis scale along which the shift took place (in one direction or the other) is a gradual phonological opposition based upon the phonetic feature of aspiration (aspirate tension). Lenition (weakening along the scale) may thus be seen as a decrease in aspiration, and provection (strengthening) as an increase. Inasmuch as aspiration is realized as a high-frequency obstruction to low-frequency vocalic sound, we can say that the stronger degree of aspirate tension represents the more consonant-like and less vowel-like element and the weaker degree the more vowel-like and less consonant-like element. Consequently, in environments in which the vocalic pattern is on-going and the consonant must overcome it (in intervocalic position), the consonant is subject to weakening and lenitive change; while in environments in which the vocalic pattern is not ongoing and the consonant is positioned during a pause (in initial position), the consonant is at least not weakened and is in a relatively strong position. The changes ensuing from this strong position, though, are often less pronounced and the provection change is realized to a lesser degree than the corresponding lenitive change of intervocalic position, unless there is a more direct application of aspiration (through stress, glottal frication, or gemination).

4.3 THE INDO-EUROPEAN SOUND SHIFT

Now that we have established the dynamic phonetic/phonological framework upon which this analysis is based, the

precise nature of the fortis-lenis scale within which the shift operates, and the manner in which this phonetic feature of aspirate tension leads to change within the scale, we can turn our attention back to the sound shift itself. Applying the phonetic and phonological principles we have determined in this and the previous chapter, moreover, we have a firm linguistic basis for positing how the shift took place. Within an aspirate fortis-lenis scale we should expect lenition possibly to occur in lenitive environments, provection in propective environments, and no change in neutral environments (that is, we should expect weakening and strengthening to occur where they are called for and only there).

4.3.a The Protolanguage's Scale

The most basic relationship is that between media and tenuis in a fortis-lenis system. For the sake of simplicity (without cost to accuracy), I shall use the traditional symbols [d] and [t] to stand for all of the mediae and tenues, respectively. Indeed, at each position of obstruction (labial, dental, velar, and even the labio-velar), the developments in the system were exactly the same, since the changes that took place were aspirate and therefore affected the obstruction without regard for or effect on the position itself (as noted in section 4.2.b).

On the basis of the evidence that can be evinced from the Indo-European languages vis-à-vis the Germanic, it is apparent that the first change to take place in the system was a slight provection in initial position as well as other

positions of strength that may have resulted from shifts in stress. In these positions, the tenuis [t] became more heavily aspirated as the aspirata [t^h] (and likewise for the other positions). This yielded the three-member aspirate system [d], [t], [t^h], from lenis to fortis. This system is not uncommon among such languages; for example, there are dialects of Swabian today that have the two-member system and others that have developed the three-member system just as it is posited here for the protolanguage.¹⁵

It was at this point that the protolanguage divided into the Germanic group and the Indo-European groups. In each case, the separate developments follow courses that are phonetically motivated and quite plausible and even probable from the standpoint of the phonetics of change within an aspirate-tension fortis-lenis system.

4.3.b Development in Germanic

Treating Germanic first, we find that the aspirata [t^h] was still in a position of relative aspirate strength, and therefore it was still subject to further provection (just as the Spanish example in section 4.2.a was subject to further lenition). Thus, we find the provective change from aspirata to spirans [θ]. For example, in initial position we find such correspondences as Gothic fōtus 'foot' and Latin pedis (genitive), Gothic þreis 'three' and Old Irish tri (Latin trēs), Gothic hunds 'dog' and Tocharian ku (Latin canis). Where stress and/or long vowels follow in the Indo-European languages (a term now used exclusive of Germanic), there may

have been a protolanguage stress shift that could also have resulted in Germanic provection. Accordingly, we find such correspondences as Old Icelandic nefe 'nephew' and Old Persian napāt- 'grandchild' (Sanskrit nāpāt), Gothic wiþrus 'yearling' and Hittite witt- 'year' (Sanskrit vatsā), Gothic bahan 'to hush' and Umbrian taʒez 'silent' (Latin tacēre 'to hush').

Throughout the Germanic language family, this provection was accompanied by a conservative lenition from tenuis [t] to media [d] where the stress originally followed and ultimately shifted back from an inflectional ending to the initial syllable of the word (or the stem), the position it was to take in Germanic in general. In these cases, the stem syllable ended in the consonant regardless of whether the inflectional ending began with a consonant or with a vowel. This, of course, is simply Verner's Law (see sections 2.3.c and 2.5.c) seen from a slightly different perspective. Thus, for example, Gothic fadar 'father' corresponds to Greek patēr, for the [d] was at once intervocalic and final (an extremely lenitive condition; compare section 4.2.a).

The contrast between the provector environment and the lenitive can be seen most clearly in the case of the factitive verbs, noted in section 2.5.c. Apparently, a prehistoric final stress had brought about a change from tenuis to aspirata internally that ultimately became the internal spirans in Gothic fra-wairþan 'to perish' (and this is also evidenced from the tenuis in the Sanskrit cognate vārtate 'he turns'). In the factitive fra-wardjan 'to cause to perish' (Sanskrit vartāyati 'he causes to turn'), however, the tenuis

was blocked from becoming an aspirata because of its weak position (final position in an unstressed syllable), weakened to a media for this same reason, and ultimately became a susurrata.

Eventually, intervocalic lenition became the rule at least for the mediae, and a new order of susurratae [ɖ] (and so forth) were developed in this position. For example, the intervocalic consonant in Gothic fadar (at least orthographically) corresponds to the susurrata in Old Icelandic faðir. In the old Germanic languages (Old Saxon, Old High German, etc.), this change was still so new that most did not represent it in the orthography. Indeed, it was so new that there were no contrasts in intervocalic position between media and susurrata, for the change simply occurred in every instance.

Thus, we find that in Germanic there was no general shift at all. The only changes that occurred were actually rather conservative changes in fairly definite lenitive or prothetic environments. The most extensive group of changes was the intervocalic lenition of media to susurrata, which took place well after the division between Germanic and Indo-European and did not involve generalization to environments other than the one directly motivating the change. It is therefore not inappropriate to say that there was no shift in Germanic and that the changes that took place in Germanic during and subsequent to the split among the language groups represent nothing more than the routine development or filling out of a fortis-lenis system in keeping with conditions in the environment.

4.3.c Shift in Indo-European

Among the non-Germanic Indo-European language groups, however, there was a far more extensive pattern of change—a pattern that we might consider a shift for its very extensiveness. More than this, however, the pattern of change generalized beyond its immediate motivating environment. The combination of the extensiveness of this shift and its generalization marks these Indo-European subfamilies as more innovative than Germanic (farther from the protolanguage in their development).

From the point of the split, where the consonant subsystem may be characterized by the opposition of media, tenuis, aspirata, [d], [t], [t^h] (again, these are used as symbols for the three degrees of aspirate tension involved in the obstruction prosody), the Indo-European language groups demonstrate a consistent lenitive shift. This shift consisted of three aspects.

First, all intervocalic consonants underwent the usual lenition that we would expect in this environment. Thus, the protolanguage's internal aspiratae (that became Germanic spirants) all weakened back to tenues. For example (as noted above), we find Old Icelandic nefe 'nephew' and Old Persian napāt- 'grandchild' (Sanskrit nāpāt), Gothic wiþrus 'yearling' and Hittite witt- 'year' (Sanskrit vatsā), and Gothic þahan 'to hush' and Umbrian taçez 'silent' (Latin tacēre 'to hush'). Likewise, all internal tenues (except as noted below) weakened to mediae, as seen in the correspondences be-

tween Gothic diups 'deep' and Illyrian bythós, Gothic sitan 'to sit' and Old Church Slavic seděti (Latin sedēre), and Gothic sōkjan 'to seek' and Old Irish saigim (Latin sāgīre 'to trace'). Finally, all mediae developed into the new, weaker order of *susurratae*, as we find in the correspondences between Old High German zerben 'to turn' and Sanskrit drbhāti 'winds', Old Saxon biodan 'to present' and Sanskrit boddhār 'knower', and Gothic steigan 'to climb' and Sanskrit steighnōti 'climbs'.

When we view this aspect of the shift, one point should be rather striking. We find here a shift from a three-member system that may be represented as [d], [t], [t^h] to another three-member system [ɖ] (or [d̪]), [d], [t]. This is effectively the exact opposite of Grimm's Law (the first Germanic sound shift, or *Lautverschiebung*). Of course, given the evidence presented earlier, we could hardly have expected anything different; but the neatness of the mirror image is nonetheless interesting.

Another interesting observation that can be made in this Indo-European sound shift (as it may now be called) is the manner in which Verner's Law fits into the description. We may recall from the previous section that Verner's Law contradicts neither the phonetic regularity of the Germanic changes nor the overall pattern of conservative change (as opposed to radical shift). In the Indo-European sound shift, however, the environment of Verner's Law constitutes the second important aspect of the shift.

In Verner's Law, the motivating factor for the exception is the presence in the following syllable of a marked accent,

realized in Germanic as stress but in at least some other groups as pitch or conceivably as marked length or tension. In Germanic, the peculiarities of the syllable structure caused by the following accent yielded the situation of the consonant being in a weak word-internal but syllable-final position. Among the Indo-European groups, however, these peculiarities did not exist, and we find a situation in which the preceding consonant would have slipped into the favored syllable initial position. For example, while the Gothic fadar 'father' may have been divided into two syllables as fad-ar, the corresponding Greek form patēr would have been divided as pa-tēr.

Just as in section 4.2.a, we find here a condition of fortis strength. The accent has been marked on an internal syllable, causing a rise in aspirate tension in the initial consonant's constraint of the vowel. This rise could indeed have motivated a change from tenuis to aspirata before the shift, and the shift could have reduced the aspirata back to a tenuis. It is also possible that the heightened tension simply blocked the shift from changing the tenuis to a media. Either way, we find what appears to be an exception (in traditional Vernerian terms--or, again, more precisely a counterexample) to the general tendency of the shift, though of course, in the former case the shift would have affected the position after strengthening, yielding only the appearance of exception (which is, after all, basically what we find in the original Verner's Law). The conservative lenition (that is, the slight lenition in a strongly lenitive environment) in Germanic coupled with the maintenance of a tenuis

in Indo-European provides us with such correspondences as those between Old High German ubir 'over' and Avestan upara 'the upper' (Greek hypér 'over'), Gothic hund 'hundred' and Latin centum, and Old High German sega 'saw' and Old Church Slavic sekyra 'ax' (Latin sēcāre 'to cut').

In regard to this particular aspect of the shift, it may be more revealing for us to consider what would happen to our own pronunciation of, for example, the Old High German ubir if we were to shift the stress (or even pitch) accent from the first syllable to the second. We should perceive an increase in tension in the pronunciation of the consonant b in syllable-initial position as the accent is shifted. This is precisely what happened in the development of the Greek hypér. Once again, either the protolanguage's tenuis became strengthened to an aspirata (to be subsequently reduced in the shift), or it resisted the tendency to weaken to a media.

Finally, the third aspect of the shift is its generalization beyond the immediate motivating environment between vowels (compare the intervocalic environment as described dynamically in section 4.2.a). Except where it was blocked by clusters (that is, by the presence of other consonants that would have interfered with the shift of the consonant in question) or by the conditions noted in the second aspect, the shift generalized to all positions. Indeed, even initial position was affected, as we find in correspondences derived from the protolanguage's aspirata such as Gothic fōtus 'foot' and Latin pedis (genitive) from [p^h], Gothic preis 'three' and Old Irish tri (Latin trēs) from [t^h], and Gothic hunds 'dog' and Tocharian ku (Latin canis) from [k^h]; in those derived

from the tenuis such as Gothic paida 'garment' and Greek baítē '(goat)skin garment', Gothic twai 'two' and Albanian dü (Latin duo), and Gothic kara 'care' and Greek gērys 'voice'; and in those derived from the media such as Gothic bairan 'to carry' and Sanskrit bhāratī 'carries', Gothic daddjan 'to nurse' and Sanskrit dhāya-h 'nourishing', and Old Icelandic gron 'mustache' and Greek charén 'upper lance point' (where ch < *gh).

The fact that the shift generalized to initial position, which is otherwise a position in which provection may weakly occur (as we find in Germanic and then later in the Old High German affricatae), may be taken as evidence that the changes involved in the second aspect of the shift began before the shift itself. That is, this generalization supports the hypothesis that the tenuis occurring before the accented syllable may initially have changed to an aspirata and then changed back into a tenuis during the general lenition involved in the Indo-European sound shift. After all, if the tendency behind the shift was powerful enough to lenite the initial consonant, it may have been powerful enough to lenite the consonant in initial position of the syllable with marked accent. Inasmuch as the former (word-initial) position is not as strong as the latter, however, the evidence, while compelling, is not entirely conclusive.

We may take the consonant subsystem found in the non-Germanic Indo-European language groups as a product of an innovative sound shift--the Indo-European sound shift. This shift proceeded upon phonetic principles from a weakening in a weakening (lenitive) intervocalic environment. The only

apparent exception (and it may not be a true exception) would appear to occur in a position of fortis strength, just as we would expect. Finally, the initial change blossomed into a full shift through the generalization to all positions, including initial position, in which the weak tendency for provection was overcome.¹⁶

4.4 SUMMARY OF THE NEW SOUND LAWS AND THE INDO-EUROPEAN SOUND SHIFT

In Chapter 2, we see that each stage in the development of the concept of the sound law has been based upon the findings of the previous generations and the prevailing assumptions of the current. Building upon the foundations of sound law theory laid in slow accumulation by scholars from Giraldus Cambrensis and Gruffydd Robert to Edward Lhuyd, Rasmus Rask, Jacob Grimm, and Karl Verner, and adding to that the more recent findings of historical linguists like Antoine Meillet, of phonologists like Nikolai Trubetzkoy, and of phoneticians like Paul Mermelstein and Joseph Perkell, we may take the sound law a short step further in suggesting that the sound law itself should not be a statement of change derived solely from the letters involved and proceeding in a direction determined by traditional (mis)conceptions, but that the sound law should be based upon the principles evinced from the best phonetic evidence available and should proceed in a direction determined not only by current extralinguistic evidence, but also and primarily by considera-

tions of the dynamic speech event.

Accordingly, in any sound law or indeed in any sound change, the first order of business ought to be the determination of the phonetic parameters underlying the phonological opposition along which the change occurred. In the case of the Indo-European sound shift, this has been accomplished, and the phonological opposition--the fortis-lenis scale--has been found to be based upon the phonetic parameter (feature) aspirate tension.

Within this opposition and this feature, themselves fully justified by the latest and most reliable evidence of phonetic science (which now incorporates dynamic phonetics, the analytical tool of the segment having been abandoned), we find precise environmentally motivated tendencies toward lenition (weakening along the scale) and provection (strengthening). For the Indo-European sound shift, this would require that the sound laws supporting the shift proceed in the manner and direction indicated from the evidence. We must ensure in the sound changes that trigger a shift (before any generalizations to environments beyond those of the preliminary changes) that lenition occur only in lenitive environments, that provection occur only in provec-tive environments, and that no change occur in nonlenitive or nonprovec-tive environments. Stated more simply, we must make sure that our sound laws and sound shifts derive from changes that are phonetically natural.

4.4.a The New Sound Laws

Examining the Indo-European sound shift developed in this chapter in the light of these requisites, we can summarize the laws governing the shift in the following conditions or tendencies found specifically in a system based upon aspirate tension in a fortis-lenis scale:

1. Where accent is not a factor, intervocalic consonants may change to the lenis.
2. Where accent creates a position of fortis strength, intervocalic consonants either do not change, or change to the fortis.
3. A consonant in a position of strength (as in word-initial position) may change to the fortis.

While these items are used in the development of "sound laws," neither they nor the "laws" derived from them apply with the unswerving regularity with which we generally associate the word law, a rather unfortunate inheritance from the previous generations of linguists. To say that a change is occurring in accordance with a particular law (or that a law "governs" a change) is simply to say that a particular identified and expected condition is applied in the change, which is all that Grimm himself ever intended, although his followers did elevate the *Lautverschiebung* to the level of a regulation (whence their seemingly frantic preoccupation with eliminating exceptions).

Examining the conditions themselves, we should note that they are in descending order of priority. That is, condition 1 represents the most likely development or the strong-

est tendency, condition 2 the next most likely or second strongest, and condition 3 the least likely or third strongest (the weakest). In the generalization involved in a shift, then, a situation derived from condition 1 may indeed spread through the other environments, though the reverse is not as likely.

The existence of such a priority ranking is by no means new. We should note that in such a system the change to the lenis in condition 1 reflects a change from marked to unmarked within the phonological opposition, which is precisely what we would expect in a general series of changes beyond the immediate motivating environment in the development of markedness theory (see section 1.3.c). On the other hand, the generalization of a marked change (provection) beyond the immediate motivating environment is not at all expected.¹⁷

Given the phonetic foundations of the conditions and the priority attributed to condition 1, we should briefly reconsider Grimm's Law, the basis of the first Germanic sound shift. For a change to have occurred in which an original media, as in Latin pedis 'foot (genitive)', should change to a tenuis, as in Gothic fōtus, is beyond reason, particularly with Verner's Law changing the tenuis in Greek patēr 'father' to the media in Gothic fadar. Grimm's Law violates condition 1. One could argue that this violation might be a generalization from condition 3, however, such an argument would be extremely tenuous, for condition 3 is not only considerably weaker in priority than condition 1, but it is even weaker than condition 2, and the evidence of these

changes would indicate that condition 2 either has been blocked or (from the evidence as presented) has succumbed to generalization from condition 1. In a word, the conditions established from phonetic evidence are directly contradicted beyond any expectation by the traditional sound laws associated with the old first Germanic sound shift (Grimm's Law).

We can reconstruct a far more reliable description of the development of Indo-European and Germanic by applying the conditions listed above in a manner consistent with the phonetic principles derived from the dynamic speech event. Indeed, this application constitutes the sound laws themselves, for the general, phonetically based feature relationship has long since replaced the lists of changes from one sound to another in the description of sound change (and in all matters relating to phonology), even among those schools of phonology that still adhere to the segment.¹⁸

4.4.b The Sound Shift

As noted in section 4.3.a, the original protolanguage sound system maintained only two degrees of aspirate tension, which we may represent as [d] and [t] (media and tenuis), once more recognizing that these symbols are being used not as letters or as "sounds," but as representations of the degrees of aspirate tension. Both the extension of this two-member system to the three-member system extant at the time of the shift and the shift itself proceeded in accordance with the conditions set forth above.

In the period prior to the shift, the two-member system

expanded to three members through the application of conditions 3 and 2. Once again, this new three-member system may be represented as [d], [t], [t^h] (media, tenuis, aspirata). It should be noted that this preliminary change may itself have been responsible to some extent for the shift that followed. With only a two-member system, the precise phonetic feature serving to differentiate the two members and hence the phonological opposition itself would have been open to some interpretation. For instance, children incorporating the system into their own internal grammatical structures (that is, acquiring the language) could well have interpreted the difference between media and tenuis as one based on voice. In that case, changes would have proceeded along completely different lines. With the third member being the aspirata, however, and with this aspirata showing up in environments quite evidently derived from the application of conditions 3 and 2, such a variant interpretation would not have been very likely at all.¹⁹

This basic system was maintained in Germanic with largely minor changes. For one thing, there was a simple reapplication of condition 3 in the change from aspirata to spirans. This development was actually no change at all in phonological terms (that is, no change in the structure or in the manner in which sounds functioned in the structure),²⁰ but a simple revaluation of the aspirata in all environments. For example, we may reconstruct the protolanguage form *t^hrei 'three',²¹ and the further application of condition 3 would thus account for the Gothic þreis.

Moreover, there was the lenition (noted in section 4.3.b)

in accordance with condition 1 that affected many of the Germanic languages, and due to its inadequate representation in early orthographies, it is not possible conclusively to say just how many of the Germanic languages were affected and to what extent. Thus, for example, the more conservative Gothic fadar 'father' corresponds to the more innovative Old Icelandic fadir. Because these forms were not usually represented in writing and in many cases left no lasting effect on the languages (with the most notable exception of English), for these Germanic languages, this change too was not phonologically significant.

On the other hand, the conservative lenition that we find in the environment of Verner's Law was indeed a phonologically significant change from the protolanguage. In these cases, where the consonant occurred in the the intervocalic position (at least traditionally) as well as in the final position of an unstressed syllable, condition 1 applied. Thus the protolanguage form $*k^h_{\text{mtóm}}$ 'hundred' yielded the Gothic hund. Just how this change occurred in relation to the Indo-European sound shift, however, is a matter of considerable conjecture and is treated further below.

All of the changes affecting Germanic were simply the changes we would expect in the development of any language or language group, and they had no effect at all on the Indo-European sound shift itself. It would be quite unreasonable to expect that since Germanic is the most conservative subfamily of the protolanguage, it should therefore not have changed at all, for it is a natural property of all languages to undergo constant change. Indeed, in every

language the dialects and even within them the idiolects differ more or less significantly at any given point in time, and any one of these differences could at any time spread throughout the language.²² It is not, then, in any lack of change that Germanic is the most conservative among the descendants of the protolanguage. Rather, the changes that Germanic underwent were relatively simple and limited to their particular motivating environments—they did not spread throughout the language, but remained where the conditions causing them were present.

Another misleading aspect of these changes derives from examining the changes that affected Germanic as a single subfamily as opposed to examining those changes that the other groups have in common. If we were to compare Germanic with, say, Hellenic (Greek), we would find that our earliest records of Hellenic also show a great many changes in addition to the general shift. The fact is that while the changes affecting Germanic do serve to differentiate it from the protolanguage, they do not constitute a shift and are relatively conservative when compared with what was going on in each of the other groups. Again, conservative does not mean showing no change at all or even fewer changes; rather, it means adhering most closely to the original system.

Finally, let us turn our attention to the Indo-European sound shift itself--the general change that all of the non-Germanic language groups (with the notable exception of Armenian--see section 5.1) have in common and that changed the system itself. The shift began as a general application

of condition 1 in the appropriate lenitive environment between vowels. Thus, for example, the protolanguage form *terb- 'to wind' developed into Sanskrit drbhāti 'winds', *beud- 'to observe' into Sanskrit boddhār 'knower', *steig 'to climb' into Sanskrit steighnōti 'climbs'; the protolanguage form *deu-p- 'deep' developed into Illyrian bythōs (th < dh), *set- 'to sit' into Old Church Slavic sěděti (Latin sedēre), *sak- 'to track' into Old Irish saigim 'ax' (Latin sāgīre 'to trace'); and the protolanguage form *nep^hod- 'grandchild, nephew' developed into Old Persian napāt- 'grandchild' (Sanskrit nāpāt), *uet^h 'year' into Hittite witt- (Sanskrit vatsā), *t^hak^h- 'to hush' into Umbrian tačez 'silent' (Latin tacēre 'to hush').

What makes this change into a full-fledged shift is that it generalized beyond this intervocalic position. This change was not a conservative shift, with generalization only to the positions that might support lenition or that would at least not resist it. Indeed, one of the striking aspects of this generalization is that it spread to word-initial position in spite of condition 3. Thus, for example, the protolanguage form *ber- 'to carry' developed into Sanskrit bhāratī 'carries', *de(i)- 'to nurse' into Sanskrit dhāya-h 'nourishing', *ger- 'to jut forth' into Greek charēn 'upper lance point' (ch < gh); the protolanguage form *paita 'goat skin' developed into Greek baītē '(goat)skin garment', *tuo(u) 'two' into Albanian dū (Latin duo), *kār- 'to cry out' into Greek gērys 'voice'; and the protolanguage form *p^hēt- 'foot' developed into Latin pedis (genitive), *t^hrei- 'three' into Old Irish tri (Latin tres), *k^huon- 'dog' into Tocharian ku (Latin canis).

As noted above, the position of Verner's Law in all of this is open to some conjecture. Certainly, the media ultimately derived from a tenuis and not from an aspirata in the development of Germanic. This restriction is necessary in order to explain the alternations found with respect to the factitive verbs (see sections 2.5.c and 4.3.b). It is entirely possible if not probable, however, that the initial positioning of the syllable-final consonant in Indo-European (non-Germanic) caused a provection from tenuis to aspirata; for example, the protoform **upér* 'over' may have strengthened to **up^hér* owing to the positioning of the consonant in the initial position of a stressed internal syllable in accordance with the propective condition 2. This may indeed have been the second such provection the consonant underwent in this position, but such a sequence is not unusual (compare the provection from tenuis to aspirata to spirans in the development of the archaic protolanguage to the protolanguage of the shift to Germanic). In such an event, the general lenitive shift may have affected this environment as well, reducing the newly formed aspiratae back into tenues.

The foregoing explanation of the application of Verner's Law to the Indo-European groups within this new hypothesis of the Indo-European sound shift (as opposed to the first Germanic sound shift) is not, however, necessary. Recalling the priority rankings of the conditions, we should recognize that the generalization of condition 1 to the point of overcoming condition 3 and not condition 2 is not at all unlikely. It would only be unlikely for a generalization of condition 1 to overcome condition 2 and not condition 3 (the weakest).

If the tenues first strengthened to aspiratae (condition 2) and then lenited in the general shift, the provection itself would mark the division between Germanic and Indo-European, and the shift would have occurred after the separation was complete; but if, on the other hand, the tenues remained intact without this initial provection, then the shift itself would mark the division. Of course, in the final analysis the distinction is academic, for the two groups did in fact separate and the Indo-European sound shift is a salient feature of that separation.

Throughout this section, I have been presenting a set of very typical examples that illustrate the correspondences between the protolanguage, Germanic, and Indo-European. These correspondences are summarized in table 4-1. In this table, the numbers in parentheses refer to the condition (the "sound law") involved in the correspondence, with 1G referring to the generalization of condition 1. The consonants exemplified are double-underscored, while other affected consonants that happen to be in the example are single-underscored. Once again, the protolanguage forms are derived from the reconstructions in Julius Pokorny's Indogermanisches etymologisches Wörterbuch adjusted to reflect the current hypotheses.

4.5 IMPLICATIONS OF THE NEW SOUND LAWS

The developments of the new sound laws and of the Indo-European sound shift based upon them have implications

for historical linguistics and for the study of our cultural heritage that are quite profound. In the long and trudging history of the sound law, we have proceeded from a view that sound correspondences are a mystery of God to the discoveries that they demonstrate relatedness among languages, that they serve to group languages together into subfamilies of an original common ancestral family, and finally that they can be used to map out the precise relationships of the Indo-European language family (the family tree).

4.5.a The Concept of the Sound Law

As early as Karl Verner, practitioners of the sound law recognized that the laws genetically relating one sound with another across languages and language groups were based upon phonetic principles that had their roots in the acoustic and physiological aspects of the speech event. However advanced these linguistic researchers may have been for their times, though, they still viewed the sound changes, correspondences, and alternations as occurring among entities that may accurately be described as letters (whether orthographic or phonetic).

Even the advent of feature theory did little to change the letter-based nature of the sound law. It has often been claimed that the use of feature analysis allows the linguist to combine such changes as [p] > [b], [t] > [d], and [k] > [g] into the simple rule [voiceless] > [voiced].²³ Of course, the same sort of combination into a "natural class"²⁴ was used

Table 4-1. Table of Correspondences

<u>Reconstruction</u>	<u>Germanic</u>	<u>Indo-European</u>
b- <u>ber</u> - 'to carry'	Got bairan 'to carry'	Skt bhā ^h rati 'carries' (1G)
-b- <u>ter</u> b- 'to wind'	OHG zerben 'to turn'	Skt drbhā ^h ti 'winds' (1)
d- <u>de</u> (i)- 'to nurse'	Got daddjan 'to nurse'	Skt dhāya-ḥ 'nourishing' (1G)
-d- <u>beu</u> d- 'to observe'	OS biodan 'to present'	Skt boddhā ^h r 'knower' (1)
g- <u>ge</u> r- 'to jut forth'	Old grōn 'mustache'	Grk charēn 'upper lance point' (1G)
-g- <u>steig</u> - 'to climb'	Got steigan 'to climb'	Skt steighnōti 'climbs' (1)
p- <u>pa</u> ita- 'goat skin'	Got paida 'garment'	Grk baītē '(goat)skin garment' (1G)
-p- <u>deu</u> -p- 'deep'	Got diups 'deep'	Ill bythōs 'deep' (1)
-p'- <u>up</u> ēr 'over'	OHG ubir 'over' (1)	Av upara 'the upper' (2/1?)
t- <u>tu</u> o(u) 'two'	Got twai 'two'	Alb dū 'two' (1G)
-t- <u>se</u> t- 'to sit'	Got sitan 'to sit'	OCS sēdēti 'to sit' (1)
-t'- <u>h</u> k'mtōm 'hundred'	Got hund 'hundred' (1)	Lat centum 'hundred' (2/1?)

ReconstructionGermanicIndo-European

k-	kār- 'to call, to cry out'	Got kara 'care'	Grk gērys 'voice' (1G)
-k-	sāk- 'to track'	Got sōkjan 'to seek'	OIr saigim 'to seek' (1)
-k'-	sēk- 'to cut'	OHG sega 'saw' (1)	OCS sekyra 'ax' (2/1?)
^h p -	^h pēt- 'foot'	Got fōtus 'foot' (3)	Lat pedis 'foot (gen.)'
^h -p-	nep ^h od- 'grandchild, nephew'	OIc nefe 'nephew' (3)	OP napāt- 'grandchild'
^h t -	^h trei- 'three'	Got preis 'three' (3)	OIr tri 'three'
^h -t-	uet ^h - 'year'	Got wīprus 'yearling' (3)	Hit witt- 'year'
^h k -	^h kūon- 'dog'	Got hunds 'dog' (3)	Toc ku 'dog'
^h -k-	^h tāk- 'to hush'	Got þahan 'to hush' (3)	Umb tačez 'silent'

long before feature analysis--Jacob Grimm used the classes of *mediae*, *tenues*, and *aspiratae* and would readily have described the above change as *tenuis* > *media*.

We achieve less generality than we may suppose by using classes or common features, however. In the change [voiceless] > [voiced] or *tenuis* > *media* (which is actually more accurate in the fortis-lenis scale; compare section 4.1.b), we are not referring to a property of voice or "voicedness" nor to a property of "meditude." Rather we are saying that those sound segments or letters that contain the feature [voiceless] change to the corresponding sound segments or letters containing the feature [voiced], or that those sound segments or letters that are *tenues* change to the corresponding sound segments or letters that are *mediae*. Hence, we almost always refer to the *tenues* and the *mediae* in the plural, and this practice is ingrained to the point that these plural forms often must be used lest communication break down.

No matter how feature-based or general our approach to the sound correspondences may be, if this approach is segmental, it is going to concern itself primarily with individual sound segments or letters. As long as this is the case, there must be sound laws derived from the correspondences to account for individual, atomistic changes. Accordingly, while we may say that a change is based on a tendency for *tenues* to become *mediae*, the sound law itself must state explicitly that *tenuis* > *media*, which is simply a generalized way of stating that [p] > [b], and so on (each *tenuis* changes to its corresponding, homorganic *media*).

A true generalization may be achieved, however, if we base our approach to the sound correspondence on principles of dynamic phonology. While the segmental approach lumps the feature into a phonemic bundle and then must repeat that feature each and every time it is assigned to a segment, the dynamic approach recognizes that this feature is a characteristic of a particular position within the syllabic frame. This approach is a more accurate way of describing such changes as those we find in the shift, for it is tied to the environment that motivates the shift in the first place rather than to the segment that is affected.

In figure 4-1, we find the dynamic description of the "intervocalic" condition introduced in section 4.2.a. This is also the environment in which the shift was originally motivated. Because of the tendencies and pressures described in the section cited, the degree of aspiration was reduced by one whole degree, to the point of creating a new lenis-most degree of aspiration. We can thus state the "sound law" as the reduction of aspiration within the syllabic frame in the configuration represented in figure 4-1, generalized to that represented in figure 4-2. Because the actual dynamic phonetic tendency is stated without regard to segmentation in any guise, it achieves a much greater degree of generality.

However, we find that in achieving this degree of generality the whole concept of the sound law has been drastically altered (although in the historical perspective of the centuries-long development of the sound law, this alteration can be seen as the product simply of the next small step in the evolution). Sound laws have been seen as the segmental

products of the realization of general phonetic tendencies in particular environments (lenition, provection, and so forth) from Karl Verner to the present. With the segment gone and the phonology based more directly upon the dynamic speech event (particularly within the syllabic frame), we find that this realization of general phonetic tendencies in particular environments can be represented directly, without an intermediate device, such as a sound law.

In effect, dynamic phonology has broken the sound law. This has not been done, of course, by a violation of the laws established by the giants of philology, who in their own frameworks and given the assumptions of their times formulated their rules in an exemplary manner. Rather, the sound law has been broken as a natural consequence of the change in framework and assumptions.

The new sound laws are nothing more than the realization and generalization of phonetic tendencies.

4.5.b Germano-European

Far more than the traditional sound law has been broken in the study of the Indo-European language family. In the reformulation of the shift that differentiates between Germanic and the other groups, the conservative position of Germanic relative to all other divisions (such as that between the centum languages and the satem languages—compare section 2.3.d) forces a reevaluation of the position of Germanic and of the whole family tree.

Traditionally, Germanic has been viewed as a group of

related languages in the centum division of Indo-European maintaining a "sister" relationship with, among others, Celtic, Italic, Hellenic, and Hittite. This relationship has been represented in figure 2-1.

This new evidence, however, suggests a radically different arrangement. For reasons that will be made clear in section 5.1, Armenian is grouped together with Germanic in the new Germano-European language family tree, represented in figure 4-3. Germanic (a centum language) and Armenian (a satem language) both forwent the Indo-European sound shift but did develop their fortis-lenis relationships from the conservative, preshift configuration. Thus, rather than a "sister," Germano-Armenian becomes the "great aunt" in relation to the various Indo-European languages, and Germanic in particular becomes a "cousin" (as will be seen more clearly in section 5.3, it was the "cousin who remained at home").

Of course, the tree represented in figure 4-3 illustrates only those relationships discernible from the shift under study, and as such, it is (as are all such trees) something of an oversimplification. With further evidence from other changes (particularly in the morphology), a more complicated structure may be evolved.

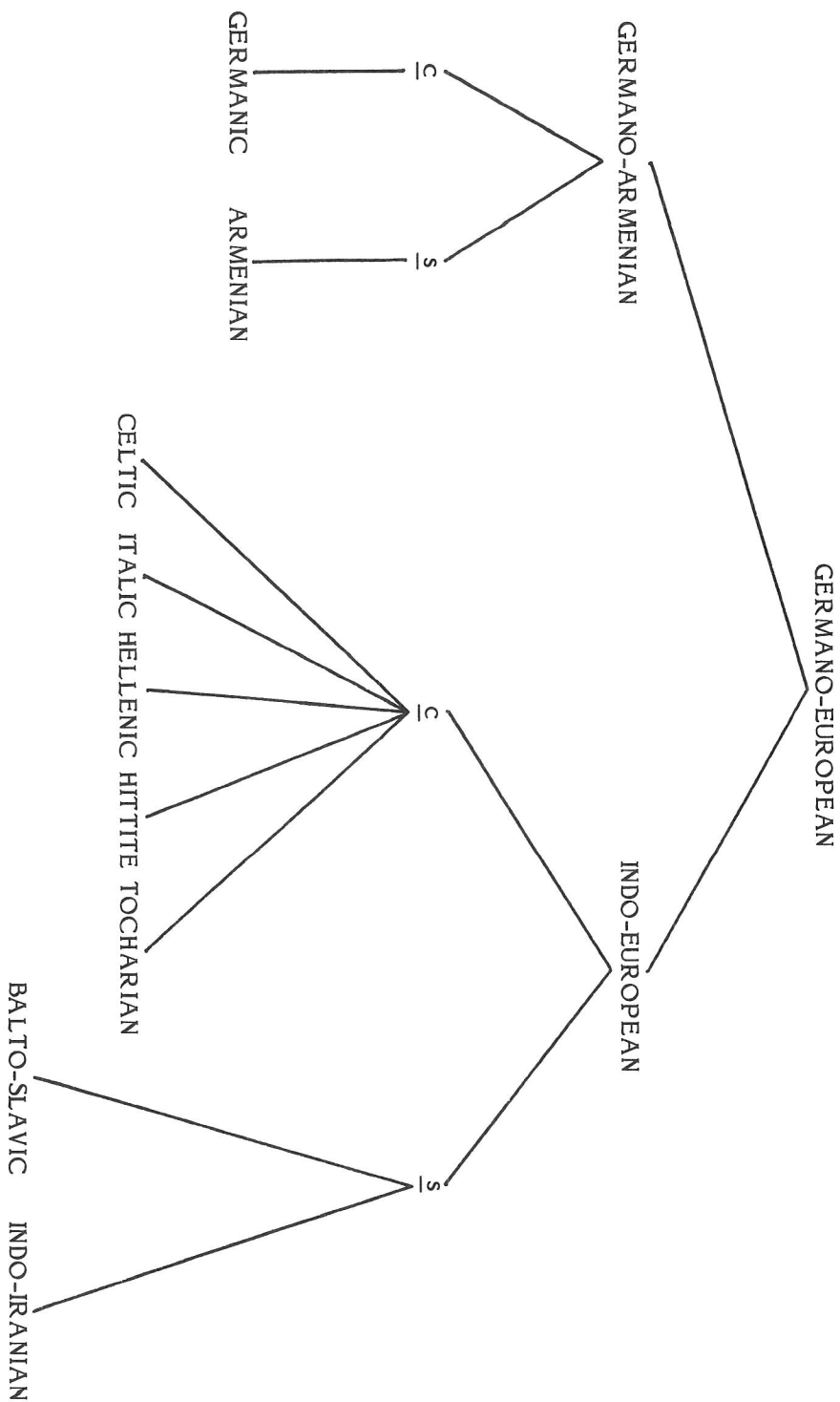


Fig. 4-3. Germano-European family tree (major groups)

CHAPTER 5

CORROBORATION

Phonetic evidence is the most reliable evidence to use in determining sound shifts, and the newer dynamic phonetics and phonology have even reduced the sound law itself to the direct realization and generalization of phonetic tendencies. Nonetheless, this phonetic evidence cannot stand on its own. After all, several thousand years separate us from the event itself, and we cannot conduct experimental acoustic or physiological experiments with native speakers. It is therefore imperative that we find corroborative evidence from other sources that will converge with the phonetic evidence we have developed.

As already noted in section 1.3, corroboration may be found as a result of three areas of investigation. These include the following: (1) areal linguistics, in particular the evidence from Armenian; (2) language typology, the phonologically based study of language universals; and (3) anthropology and archaeology. While volumes could be written on just that evidence from these areas that supports the Indo-European sound shift, this corroboration is summarized briefly in the present chapter.

5.1 AREAL LINGUISTICS: THE CASE OF ARMENIAN

Armenian is spoken in an area between the Black Sea and the Caspian Sea, in the modern frontier region between Turkey and the Soviet Union. As such, it is at a rather extreme distance within the original realm of the Germano-European languages from Germanic. Nonetheless, the consonant subsystem that forms the basis of the Indo-European sound shift and the division between the conservative Germano-Armenian, on the one hand, and the innovative Indo-European, on the other, is remarkably similar between Germanic and Armenian.¹

5.1.a The Consonants of Armenian

It has often been stated in the traditional approach to Indo-European that Armenian underwent a shift remarkably similar to the first Germanic sound shift.² Indeed, the correspondences would bear this out, most directly with the Armenian *tenuēs* and *mediae*. At least the dental and velar *tenuēs* show the same relation to the Indo-European as does Germanic, and we find such correspondences as Armenian tiv 'day' and Sanskrit dīvā 'by day', Armenian ker 'food, meat' and Sanskrit gīrāmi, relating the Armenian *tenuēs* with the Indo-European *mediae*. Moreover, the *mediae* are all related in the same way to the Indo-European *susurratae*, as we find in such correspondences as Armenian ba-n 'word' and Greek phēme 'speech' (where ph corresponds to Sanskrit bh),

Armenian diem 'I suck' and Sanskrit dhāyāmi, Armenian gan 'strokes, blows' and Sanskrit ghan-ā-. In many of these sounds, there are also subsequent changes and variations similar to the types we have seen in the other language groups, but these are not directly of interest to the subject at hand.

It should be fairly clear from the data so far that the Armenian *tenues* and *mediae* parallel the Germanic quite precisely. Here, then, we have a choice about which reconstruction we wish to use for the protolanguage. The Armenian sound shift would be identical to the Germanic in the traditional approach; while in the new hypothesis of an Indo-European sound shift, Armenian would be considered conservative and would simply forego the shift altogether. As shown below, this latter choice is more consistent with principles of areal linguistics.

It is in the *fortis*-most order of consonants, those that are derived from *aspiratae* in the new hypothesis, that the most direct evidence can be found for the conservativeness of Armenian and the new reconstruction. Among the labials, we find an *aspirata* where the other language groups maintain an [s] + [p] cluster; for example, Armenian [p^hoit^h] 'haste' corresponds to Greek spoudē. After vowels, the labial became a *susurrata*, yielding such correspondences as Armenian evt^hn 'seven' to Latin septem. Finally, the initial labial became simple aspiration (the glottal fricative [h]), as we find in the correspondence between Armenian hing 'five' and Greek pēnte.

Given the principles of aspirate tension in the dynamics

of the speech event (as discussed in Chapter 4), it should be fairly clear from these data not only that Armenian parallels Germanic, but that it does so through aspiration. First of all, the [s]-plus-consonant combination is a well-known deaspirating environment (for example, if we splice the s from a tape recording of English spill, what the English speaker will hear is not pill, but bill, due to the loss of aspiration). The survival of aspiration in this environment thus suggests a strongly aspirate system.³

Extreme aspiration can also explain the development of such forms as Armenian hing 'five', but only if the process begins not from a tenuis [p] with no audible aspiration (as used here, the puff of breath--glottal frication), but from an aspirata [p^h] with the glottal frication already present. At the same time, the [v] after vowels cannot be derived from the tenuis of Indo-European, but it can be derived from the spirans that would evolve from an aspirata (as in Germanic). Subsequent reinterpretation of the sound along the parameter of voice could then account for its change to a susurrata (in much the same way as a similar change in Latin).⁴ The reconstruction proffered here in both these instances accounts for the changes more directly and more in keeping with the system than does the old reconstruction and its first Germanic sound shift with parallel changes in Armenian.

In contrast to the labial, the Armenian dental appears to be far more conservative. It is basically an aspirata, as in the correspondences between Armenian t^harām-i-m 'I become dry, wither' and Greek tér̄sōmai, and it maintains this aspi-

rated state even when it becomes a velar (Armenian k^ho 'of thee', Sanskrit tvám). After [s], it deaspirates as expected, yielding Armenian astt 'star' (Greek astēr). Again, such developments are indicative of an aspirate system, and an aspirate system would undergo the type of change predicted from the new reconstruction.

Finally, the dorsals are typical of the satem groups in that they are traditionally divided into two sounds--the back or velar [k] and the front or palatal [c] ([k̠], or [kʰ]). This division has often created some difficulties, the most straightforward and credible explanation is put forth by W. B. Lockwood: "in the emergent, but still contiguous . . . satem groups, IE k and g developed a marked palatal quality before front vowels, becoming fricatives from which, by further change, sibilants arose in some cases."⁵ This process should be familiar to speakers of English, as it is much the same process as that which has changed the pronunciation of final c from [k] in electric to [s] in electricity.

The velar variant became Armenian [k], [k^h], or [c], with such correspondences as Armenian akn 'eye' and Lithuanian ak-i-s, Armenian lk^h-ane-m 'I leave' and Greek limpānō, Armenian ač-k^h 'eyes' and Lithuanian ākys. Not only does the existence of the aspirata here suggest an aspirate system consistent with the new reconstruction, but the affricate [č] in the i-stem ač-k^h demonstrates the provection to a new intermediate degree quite parallel to what happened in the High German sound shift, which proceeded along the aspirate fortis-lenis scale as well.

The palatal variant simply underwent the change to [s],

as we find in the correspondence between Armenian sar 'height' and Sanskrit śīras-. While this may not appear to be significant from the comparison of forms, as we see in section 5.1.c the whole question of the satem change is of major significance in the phonetics of the Germano-European sound system as reconstructed here.

From all of these correspondences, it should be quite clear that Armenian and Germanic have roughly the same consonant system (with regard to the sounds involved in the shift), with the major exception that Armenian is a satem language and Germanic a centum. Moreover, from the standpoint of phonetics, the Armenian system's repeated reliance on aspiration as a distinguishing feature is a strong indication that it was derived from a protolanguage's consonant system, which was arranged along the fortis-lenis scale based upon aspirate tension. From what we have seen in the previous chapter, this would likewise be strong evidence for the hypothesis proffered here for the aspirate system [d], [t], [t^h] as the protolanguage's system at the time of the shift (compare section 4.3.a).

We are not primarily concerned in this section with the phonetic corroboration that may come from Armenian, compelling as that corroboration may be. Rather, the primary concern here is to determine corroboration from a different area of linguistics altogether, from that part of comparative linguistics that examines the role of geography--areal linguistics.

5.1.b The Norms of Areal Linguistics

In Chapter 1 (section 1.3.a), several principles of areal linguistics were presented. These principles were developed chiefly by Matteo Bàrtoli in keeping with attested patterns of dialect and language diversification. Among the norms developed by Bàrtoli was the norm of the lateral or peripheral area: If in a language or language family we find that two widely separated areas--areas on the periphery of the bulk of dialects or languages--consistently share common traits that differ from the bulk in the middle, then these lateral (peripheral) areas maintain the more conservative form. This is illustrated as area 2 on the map in figure 1-4.

The distribution of language groups in modern Europe is presented on the map in figure 5-1. When we compare the relative positions of Germanic and Armenian on this map with the lateral areas illustrated on the map in figure 1-4, we should notice a striking similarity. Indeed, according to the norm of the lateral area, if Germanic and Armenian should maintain identical consonant systems, then the common points of their system should be considered the conservative representatives of the protolanguage consonant system.⁶

One could object to the application of the norm of the lateral area in this instance under one ostensibly plausible set of conditions. Let us say that the various language groups split up, Germanic underwent the first Germanic sound shift, and then Armenian split off from Germanic

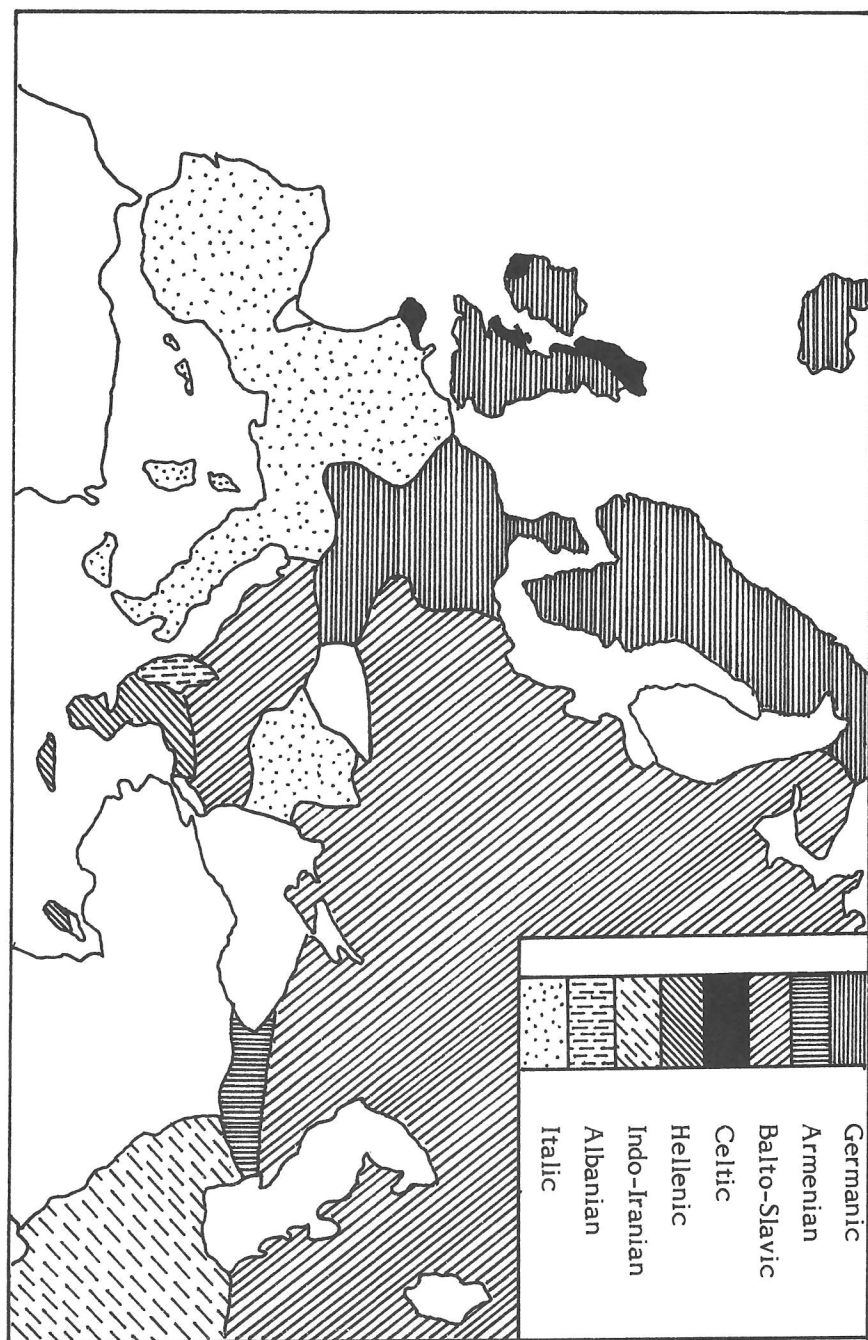


Fig. 5-1. Distribution of Germanic and Armenian

(rather than from a common Germano-Armenian) and its speakers migrated to Armenia. The plausibility of this explanation vanishes, however, when we realize the full implications of Armenian's status as a satem language.

On the one hand, let us say that the development of the satem language distinction (the change from the fortis-most dorso-palatal stop to [s]) occurred before the alleged first Germanic sound shift. In such a case, the sibilant would have developed directly from a tenuis--a highly unlikely event (if not an outright impossibility). On the other hand, let us say that the development of the satem language distinction occurred after the alleged shift. While this would have the sibilant in Armenian developing directly from an aspirata, it would require that the other satem languages develop their sibilants from tenues. As shown in section 5.1.c, the entire question of how and when the satem languages changed rather supports the hypothesis of the Indo-European sound shift.

While the norm of the lateral area is perhaps the most obvious indication in areal linguistics that Germanic and Armenian maintained the most conservative consonant systems, it is not the only corroboration for the conservativeness of Germanic from areal linguistics. The norm of the latter area does not, of course, apply here, as the culture under study was expanding rather than being conquered; and the norm of the principal area also presupposes a more stable condition rather than the disruptive migrations that were actually taking place. This latter norm applies only when it is not contradicted by the first two norms, and we

have seen that it is in fact contradicted by the second.

Turning our attention to the first norm, the norm of the isolated area, we might also be inclined to dismiss it as not applicable. After all, east-central Europe is neither an island nor even a particularly mountainous region. However, the point of the norm is that lack of contact between one language and others tends to preserve the linguistic system, while frequent contact with other languages in the same and other families tends to introduce new forms and other innovations into a language. Taking the point of this norm together with the geographical situation of the Germanics, we should come to a conclusion different from that of the early Indo-Europeanists.

As has long been maintained by Indo-European scholars (supported by anthropology; see section 5.3 below), the homeland of the protoculture long before the migrations that split up the languages was situated around modern East Germany, Poland, and the Ukraine--the traditional area of the (East) Germanic culture.⁷ For reasons unknown, a vast migration or series of migrations radiated from this homeland in all possible directions--the dynamics of migration were, then, directed away from the homeland. In a prehistoric European culture that lacked the technology to maintain close communication between the homeland and the migrators and that was probably in one or another state of hostility anyway, this radiating pattern of migration would have been as isolating as any island or mountain range. Not only would the homeland culture have lost contact with the migrators, but the migrators would have swept away any

immediate neighbors who could have reestablished linguistic contact with the homeland culture after the migration passed. This would have created an isolated area for the homeland culture--an area inhabited by the Germanics.⁸

Insofar as Armenia is concerned, there is also a geographic basis for treating the area as one of isolation: it lies within mountainous terrain, located in an inhospitable region off the established trade routes (which bypass the area on the north and south). Moreover, lying between the Black Sea and the Caspian Sea, Armenia is quite isolated from direct contact with the west and the east as well. For purposes of linguistic contact, then, the region may as well have been an island.

Thus, by the two applicable norms of areal linguistics, the most conservative of the language groups should be Germanic and Armenian. By the norm of the lateral area, that Germanic and Armenian share virtually the same consonant system is strong corroboration for the hypothesis that it was a Germano-European language family that split into the conservative Germano-Armenian group and the innovative Indo-European group through the Indo-European sound shift. By the norm of the isolated area, the Germanic languages of this Germano-Armenian group should be the most conservative by virtue of their isolation from contact with others (including during the migrations themselves) and the consequent lack of any innovating influences.

Once again (as in section 4.5.b), the apparently close "family" relationship between Germanic and Armenian holds for the shift under investigation. Other areas of the linguistics-

tic structures may neither be as close in detail, nor indeed may the areal norms be as faithfully applicable. Nonetheless, the evidence is corroborative (if not absolutely conclusive), and such corroboration should inspire linguists to look more closely at this particular relationship.

5.1.c Implications for the Satem Languages

In section 1.3.a, we saw that the evidence of areal linguistics is rather more circumstantial than direct. While it may be good corroborative evidence, it should not be used as the only evidence, nor even the primary. The primary focus of investigation should be on the phonetic plausibility of change in the consideration of phonetically motivated sound change.

In the corroboration of the Indo-European sound shift and the reconstruction of a Germano-European aspirate-tension system, the consideration of areal norms introduces an interesting hypothesis concerning the position of the satem languages with regard to Armenian and in general. To this point, the hypothesis, however important to the matter at hand, is still areal in nature and is in need of phonetic corroboration. Accordingly, we should consider the phonetic plausibilities involved in the development of the satem languages.

The whole question of the direction taken by the sound shift (First Germanic or Indo-European) is affected to some degree by the manner in which we incorporate the satem change. Certainly, the evidence is compelling enough with-

out this incorporation; but its effective incorporation will lend an even more compelling level of credibility to the Indo-European sound shift. If the traditional approach is correct, then the sibilant would have derived from a palatal tenuis [c] in the satem language groups, including Armenian prior to the sound shift that gave it a Germanic-type consonant system. If, however, the new hypothesis of a Germano-European language family is correct, then the sibilant would have derived from a palatal aspirata [c^h] in the protolanguage--a basis for dialect variation before the Indo-European sound shift (as it affects Armenian as well as the Indo-European satem groups).

The first thing we must do in determining the phonetic plausibility of one change over the other is examine the acoustic properties of the sibilant, the sound to which either tenuis or aspirata changed. The position of the sibilant varies among the satem languages, with Armenian and Slavic maintaining the alveolar [s] and Sanskrit a retracted palatal(ized) [s̠]. Nonetheless, the precise position of the original sibilant was most likely more retracted (farther back) than the later attested [s] and probably closer to the grooved [ʃ̥] (as in English sheet as opposed to seat), given the route of change from palatal stop, through palatal fricative (similar to the German [ç] of section 3.3.b), to sibilant (in keeping with Lockwood's premise in section 5.1.a).

We make a noteworthy discovery when we examine the spectrogram to find the common characteristics of all voiceless sibilants⁹: Sibilance (voiceless) is marked by high-level-energy noise. Generally, though the precise frequencies will

vary depending upon speaker and language, the noise associated with the [š] sound begins around 1,600-2,500 cycles per second (cps), and that associated with the [s] sound begins around 3,500 cps.¹⁰

The main question now concerns where this high-energy noise came from in the process of change. The voiceless palatal stop tenuis has a much different energy distribution. Rather than an area of noise (a "cloud" on the spectrogram), the unaspirated stop is marked by a deviation in the vowel formants, with the deviation directed toward a particular point, or locus. The locus cannot be seen on the spectrogram in the case of the stop, because the stop creates a break in the formant patterns. Moreover, with no aspiration, there is no noise coming after the break, and often the only way of telling that the stop is voiceless (a tenuis) rather than voiced (a media) is by measuring the length of time before the vowel formants are visible.¹¹

On the other hand, the aspirated stop (the aspirata) is more similar to the "noisy" sibilant. There is a period of noise coming directly after the break when aspiration is involved. Unlike the exclusively high energy noise of the sibilant sound, the noise associated with the aspiration of an aspirata is concentrated at the frequencies of the following vowel formants. In a way, the aspirate noise leads into the vowel formants.

It is at this point that the distinction between the palatal [c^h] and the velar [k^h] becomes important. Once again, the palatal is produced before a front vowel, and the velar before a central or back vowel. As mentioned in sec-

tion 3.2.b, the vowel is acoustically identified primarily by the first and second formants. As we examine the second-formant frequencies of vowels in a progression from back to front (from velar to palatal),¹² we discover that the second-formant frequencies gradually rise, reaching a range of 2,000–3,500 cps with the front or palatal vowel [i]. The second-formant frequency range is slightly lower for the [e] and other front vowels, but it never begins below about 1,600 cps for a front vowel—one that would be coarticulated with a palatal consonant as opposed to a velar one. The velar [k^h] constraining a nonfront (central or back) vowel would maintain aspirate noise at a level significantly lower than 1,600 cps in the production of an aspirated stop (aspirata), while the palatal [c^h] constraining a front vowel would maintain aspirate noise at a level above 1,600 cps.

With the acoustic characteristics of the various sounds in hand, we are now ready to address the question of where the sibilance came from. There is no noise in the tenuis to support a change from the tenuis to the high-level-energy sibilant. But there is a significant amount of noise in the aspirata and this noise could support a change from aspirata (eventually) to sibilant, but only among those aspiratae that maintain a frequency level high enough to overlap with that of the sibilant and thus close enough to create confusion between the two sounds. This overlap occurs with the palatal aspirata and only with the palatal aspirata.

Moreover, the change from aspiration to sibilance is actually fairly common in connection with the aspirata. For example, in some dialects of Welsh (chiefly in the north),

the aspirata [t^h] is pronounced with enough force to render it the affricate [t^s]. Welsh-English bilinguals will pronounce Welsh te 'tea' as [t^se:], but English tea as [t^hi:]. Such a process was also responsible for the change from aspirata to affricata in the High German sound shift.¹³

The development of a sibilant in the satem languages, including Armenian, would have proceeded from an aspirata, not from a tenuis. This point of phonetic plausibility reveals a great deal about the prehistory of our protolanguage. Inasmuch as the satem change took place not only in Armenian with its consonant system close to that of Germanic, but also in the satem groups of Indo-European, it should be very clear that the change occurred at a time when all of the language groups--the protolanguage itself--maintained an aspirate system with the fortis-most element an aspirata.

The more reliable protolanguage would thus appear to be Germano-European, and not the old Indo-European. There must have been two dialects in Germano-European: one in which the [c^h] remained aspirata and the other in which a slightly more forceful pronunciation was developing sibilance.¹⁴ It could only have been at this point that the shift occurred, and the shift could only have occurred from the Germano-Armenian-type system to the Indo-European-type system. Given the phonetic plausibilities involved in the sound correspondences, this is the only way we can reconcile the centum-satem division with the shift.

Thus, not only is the areal evidence from Armenian significant corroboration for the hypothesis of an Indo-European sound shift from a proto-Germano-European, but the

areal evidence supported by phonetics suggests that the very existence of the satem languages is strong interlocking corroborative evidence as well.

5.2 LANGUAGE TYPOLOGY: THE GLOTTALIC THEORY

As noted in section 1.3.b, another linguistic source of corroboration may be found in language typology—the search for universals. As its name implies, language typology is the study of languages categorized into particular types. Given patterns of change in languages of one type, the analyst predicts the kinds of changes in another language that appear to behave within those patterns.¹⁵

5.2.a Typology and the Phoneme

Some typological considerations have entered into the presentation of the Indo-European sound shift hypothesis thus far. There is, however, a great difference between these and the practices of language typology. In taking into consideration the manner in which aspiration typically affects phonological systems, I have concentrated upon the phonetic detail involved and have used occurrences in similar systems not as evidence, but as examples.

In language typology, however, the examples are the evidence. Moreover, the evidence itself is not concerned directly with the phonetics involved in the changes, but with

matters of phonemics (the abstract representation of "sounds"; see section 3.1.b). Rather than examining the phonetic substance of the phonological system as a whole, typologists work simply with abstracted phonological segments in their systems (which, to be sure, are often derived from segmental phonetic considerations, as seen below). In the investigation of change, then, we have a before-and-after presentation of phonemic inventories and relations, with the main justification or explanation for the change being that languages of this type have been known to display the same or similar patterns.

Language typology contains serious weaknesses compared with the method of phonetic justification used in Chapter 4. By taking into consideration primarily the phonemic systems, it can often miss the underlying phonetic pressures for change,¹⁶ and these pressures can sometimes have surprising and atypical results. For example, in many dialects of Swabian, an aspirate fortis-lenis language, the word-final position that would typically be weakened is in fact subjected to considerable strengthening, which a typologist working only with the phonemes involved would declare to be seriously anomalous; but a close examination of the dynamic phonetics in this situation reveals the workings of another phonetic factor--a voiceless vowel completely obstructed by the consonant.¹⁷ Such an insight would be missed in typology, for in working with phonemic systems to the exclusion of dynamic phonetic detail, typologists are also working in effect not with sound, but with letters. Moreover, in missing this insight, a typologist could well

misclassify the language.

In typology, there is another weakness that involves the exclusive use of phonemes. A series of phonemes may be related to one another by several different phonetic features. For example, /t/ and /d/ may be related by voice, aspirate tension, articulator retraction, degree of occlusion, glottality, or something else. That two languages oppose the two phonemes tells us nothing about how a change will affect them, without further phonetic detail. Without this detail, we run the risk of classifying the sounds in accordance with a feature that is not pertinent to the type of change involved. Furthermore, we run the risk in a series (such as the fortis-lenis scale) of breaking up a single gradual opposition between two different feature relationships, or conversely of including too many in a single gradual opposition.

The use of typology as a primary investigative tool, then, is not recommended when dynamic phonetic plausibilities can be determined instead (though, of course, typologists will take strong issue with this recommendation). However, it can provide us with quite good corroborative evidence. As the evidence of typology is its examples, then the findings of typologists may be useful insofar as they represent a collection of useful examples and conclusions based upon a large number of sample languages.

5.2.b Typological Reconstructions

In the writings of such typologists as Thomas Gamkrelidze and V. V. Ivanov, Paul J. Hopper, and Allan R. Bomhard,¹⁸ serious problems with the traditional notions of the first Germanic sound shift and the traditional reconstruction of proto-Indo-European have been treated.

In table 5-1, the traditional reconstruction of the Indo-European phonological system according to Winfred P. Lehmann¹⁹ is compared with the innovative reconstructions along typological lines by Gamkrelidze and Ivanov and by Hopper, on the one hand, and by Bomhard, on the other. The superscript [[?]] refers to glottality, treated further below.

At first glance, the system reconstructed by the typologists bears close resemblance to the Germano-European reconstruction proffered here, and the similarities are in fact quite substantial. Such a typological reconstruction should be more accurate than the old one, if for no other reason than the old reconstruction was basically arbitrary (when viewed in accordance with more modern principles and assumptions), while the typological reconstructions are based upon the patterns observed in other languages with similar phonological systems. But the use of phonological (phonemic) systems without consideration for phonetic plausibilities leads to some serious deficiencies in the reconstructions.

The aspiratae reconstructed in the first typological system are quite accurate from a phonetic point of view, taking into consideration the patterns of change that have

Table 5-1. Typological Reconstructions

p	t	k	k ^w
b	d	g	g ^w
b ^h	d ^h	g ^h	g ^{wh}

1. Traditional: Lehmann

p ^h	t ^h	k ^h	k ^{wh}
(p [?])	t [?]	k [?]	k ^{?w}
b ^h	d ^h	g ^h	g ^{wh}

2. Gamkrelidze/Ivanov/Hopper

p/p ^h	t/t ^h	k/k ^h	k ^w /k ^{wh}
(p [?])	t [?]	k [?]	k ^{?w}
b/b ^h	d/d ^h	g/g ^h	g ^w /g ^{wh}

3. Bomhard

sprung from them. That the second typological reconstruction does not include them is not based on a belief that they were not there, but from considerations of phonemics. As Bomhard points out, "The voiceless aspirates were thus not phonemic in Indo-European and did not become so in the majority of the daughter languages."²⁰

What is asserted in the typological reconstruction, then, is that the aspiratae were there in predictable environments; but because their environments were predictable, they were merely variants of *tenuis*.²¹ Because the aspiration is predictable and not phonemic, it is not taken into direct consideration in the pattern of change. While the choice of the *tenuis* over the *aspirata* may be sound from a phonemic standpoint and therefore quite appropriate in the typological reconstruction, it misses the whole point of the change itself, which (as we have seen in the previous chapters) relied heavily on this "nonpertinent" aspiration.

Insofar as the *lenis*-most member of the "scale" in the typological reconstructions is concerned, there is some disagreement. While proponents of the first typological reconstruction (principally Hopper) maintain that they were murmured, Bomhard argues that they were at least sometimes voiced stops--*mediae*. Of course, the latter would agree more closely with the Germano-European reconstruction and is more reliable from a phonetic standpoint (given subsequent changes in several of the languages), but it is still problematic, as pointed out further below.

At the heart of the typological reconstructions, though, is the glottalic theory, described by Bomhard as "the single

most important contribution to the reconstruction of the Indo-European phonological system made during this century."²² Once again drawing from phonemic patterns exhibited by known languages, the glottalic theory states that the middle consonants in the "scale" were glottalized; that is, they were marked by an ejective, forceful articulation. This glottalic theory is agreed upon by all of the typologists working in this area and is the major part of their reconstructions.

In the development of the Indo-European languages, Germanic and Armenian (as well as Tocharian and Anatolian) simply deglottalized these consonants, and they thus became the *tenues*. The other language groups, however, underwent a change from glottalization to creaky voice (vocal fry) to full voice. As always, this type of progressive change is documented in known languages (mainly in Caucasian and southern Arabian languages). Thus, the typological reconstruction of events would put the "shift" not in Germanic and Armenian, but in the other language groups--a significant agreement between typology and this phonetic plausibility.

The problem with the glottalic theory is that it represents a leap from the system of some languages to the Indo-European without any phonetic basis (besides the phonetic progression above, as attested in other languages). It takes a set of conditions in some known languages' phonemic systems and applies them to the single, unified Indo-European. While the particular changes can indeed be accounted for by glottalization and they are accounted for

quite neatly and (in isolation) in a compelling and convincing manner, the introduction of glottalization is based upon the need for making the changes work in the phonemic system and not upon any basic consideration of the way in which the overall sound system of Indo-European might have functioned.

This leads directly to the main problem with the typological reconstructions. The protolanguage had an occlusive system that underwent a series of changes due to a particular set of tendencies--a particular pressure on the system. In the conglomeration of linguistic systems used in the typological reconstructions, the first element (lenis-most) of the system underwent changes typical of murmured occlusives or voiced stops, the second element underwent changes typical of glottalized stops, and the third underwent changes typical of (perhaps aspirated) voiceless stops. All of this is proposed to resolve some particular phonetic pressure on the "single" phonemic system.

What has occurred in this case, then, is the realization that there is a danger to which language typology is particularly vulnerable. Typologists have created a system which is indeed found in several of the world's languages by piecing together elements of various languages known to change in ways similar to the protolanguage. Moreover, the changes suggested are all attested in known changes in these and other languages. When the whole system is assembled and all of the changes are posited, the reconstruction has the appearance of validity.

However, could a single language faced with its own

inherent tendencies and its own phonetic pressures incorporate all of these changes, each based upon some different phonetic characteristic of the phoneme in a phonemic system? The chances against it are high. In a choice between this reconstruction and the Germano-European one based on phonetic plausibilities, the typological reconstructions would be considerably less reliable.

5.2.c Corroboration

Although the typological reconstructions are not as reliable as the phonetic reconstructions, and although they have serious deficiencies, they are nonetheless far more reliable than the traditional reconstruction of an Indo-European protolanguage. The traditional view did not take into consideration at all such factors as the manner in which languages are known to change within certain typological classifications. Reliability is relative, and in the absence of phonetic reliability, typological reliability is far preferable to arbitrariness.

Typology has been and will remain a very valuable tool in linguistic investigation, in spite of the seemingly harsh critique made in this section, and the particular contributions of the typologists noted are certainly to be considered great (not only within the confines of typological methodology, but in linguistics in general). Should modern typologists attend more closely to the physiological and acoustic aspects of dynamic phonetics, then typology and phonetic plausibility would quite naturally merge.

On the basis of the relative reliability of the typological reconstructions, it is of major significance and importance that typological evidence should at least indicate that Germanic (and Armenian) be the more conservative language group and that the real shifting have taken place among the other Indo-European languages. Indeed, the single factor of Germanic's conservativeness would stand out in any pertinent typological investigation that could be conducted. Thus, while a total reconstruction of the protolanguage's consonant system may contain some problems, this single fact supplies us with good corroboration in our reconstruction along phonetic lines of a Germano-European protolanguage that split into Germano-Armenian and Indo-European.

5.3 ANTHROPOLOGY: THE MIGRATION AND DIVERSIFICATION OF THE KURGANS

As noted in section 2.4.c, there has been a major change in the anthropological underpinnings of the sound shift since the time of Jacob Grimm. Once again, as we have seen repeatedly in the historical development of the sound law, the anthropology of Grimm's time was heavily influenced by traditional assumptions that we today would dismiss because of the influx of new and more reliable evidence. Indeed, as linguists became more scientific in their approach, devoting more time to the analysis of data and enjoying more insights and breakthroughs as a result, the same occurred in the field of anthropology.²³

5.3.a New Principles

In the development of anthropology and its relationship to linguistics, perhaps the single most profound change that has occurred is the dismissal of the previously strongly held opinion that race and language are necessarily intertwined. When the early researchers into the Indo-European languages arrived at their notion of the shift, they treated Sanskrit as the most conservative language (if not the parent language) because of a belief that the racial and hence linguistic origins of the European peoples were to be found in Asia.

The assumed relationship between race and language has long since been dismissed not only on anthropological grounds but on the evidence from neurolinguistics, going all the way back to the brain studies of Paul Broca in the nineteenth century.²⁴ Still, by the end of the century, William Z. Ripley in his classic The Races of Europe: A Sociological Study had to state, "Let us at the outset avoid the error of confusing community of language with identity of race."²⁵

Precisely seventy years later, John Geipel, after quoting the statement by Ripley, added "Despite a persisting belief to the contrary, race and language have no influence on one another."²⁶ He went on to note that "one language may be abandoned and another adopted for all kinds of reasons, the most significant being: subjugation by another people, the cultural influence of an allegedly superior foreign civilization . . . and the need to communicate with speakers of another language for the purpose of trade."

Another change that has even more direct impact on the study of the Germano-European languages has been the shift in the homeland of the protoculture from Asia to Europe. In his work The Aryans: A Study of Indo-European Origins published in 1926, V. Gordon Childe summarized these developments as follows:

The hypothesis of an Asiatic origin for the Aryan peoples is the most venerable but the least well documented. Indeed it belongs in part to that realm of anthropological mythology the roots of which go back to the Biblical story of the Tower of Babel. In that world of prescientific speculation all races were derived from Asia which was regarded as a vast reservoir of peoples, and it was assumed that all migrations followed the sun from East to West. To this extent the doctrine of an Asiatic cradle of the Aryans is only one of the unfounded generalizations which anthropology and archaeology have been combating for the past seventy years. We now know that the relations between Europe and Asia have not been so one-sided as our ancestors believed, and that culture and population flowed in both directions.

But the theory of an Asiatic cradle did not rest exclusively on prejudice. The supposed high antiquity of Sanskrit and its apparent linguistic purity were powerful arguments in the hands of the Orientalists and even led Schlegel (1808) to assert that the parent language itself originated in India and spread thence westward. A rather similar idea has cropped up in the writings of Sergi; he supposes that the ancestors of the European Aryans were a brachycephalic stock originally inhabiting the region to the north of the Hindu Kush. There they would have learned the language of the Mediterranean Hindus and carried it with them into Europe. But modern philology can no longer regard Sanskrit as in all respects the purest representative of Indo-European speech. The fine state of preservation of the

original inflection, due in part to the very early fixation of the language in a metrical literature, must indeed be admitted. But phonetically Sanskrit reflects the parent speech less faithfully than many European languages.²⁷

It is in these two new developments that we find the corroboration for the Indo-European sound shift predicated upon a Germano- (rather than an Indo-) European protolanguage. For the convenience of reference, let us refer to the principle that language is not connected with race but rather with culture, and that cultures can change their languages for whatever need may arise as the ethnolinguistic principle; and by the same token let us refer to the principle that the homeland of the Germano-European culture was in Europe, rather than in Asia, as the Kurgan principle (for reasons that are made clear below).

5.3.b The Kurgans

As noted above, the latest anthropological and archaeological physical evidence supports the hypothesis that the protoculture originated in east-central Europe, anywhere from eastern Germany, through Poland, and even to the Ukraine. This is based on racial characteristics and on the cultural implements found in certain burial mounds, called kurgans, originally located in Russia. These mounds were simple tumuli from twenty to fifty feet in height and sometimes arranged in groups spreading over miles of terrain.²⁸

The people who built the kurgans may themselves be called Kurgans for convenience, and they are identified as a

homogeneous racial type by the shape of the crania excavated from the tumuli. More importantly, the Kurgans are identified as having belonged to a homogeneous cultural group by the decorated battle axes (or boat axes) and the corded pottery found in the tumuli as well. Apparently, these people swept in from the Russian steppes during the Neolithic period, bringing with them copper implements and weapons with which they imposed their cultural dominance (and their language) upon the peoples populating Europe at the time.

At this point, it might appear that the notion of an Asiatic origin for the Germano-Europeans is not far off and that perhaps we should return to the old Indo-European hypothesis. The fact is, however, that this early migration of the Kurgans was a preliminary step in the development and dispersal of the Germano-European peoples, just as the first migrations from the African plains were preliminary. As for the later developments, which are more pertinent to the protoculture itself, a great deal has been uncovered, particularly in the work of Marija Gimbutas and others since the 1960s.²⁹

Piecing together artifacts consisting mainly of animal-head sculptures and peculiarly decorated and configured implements (especially the characteristic battle axe), Gimbutas traced the migration of these Kurgans from Russia to Europe, and from there in a pattern of expansion and diversification in all directions. This process took thousands of years and is divided into three periods (with subdivisions): Early Kurgan of the fifth millennium B.C., in which the

people were established north of the Black Sea; Middle Kurgan of the fourth millennium B.C., in which they infiltrated Central Europe and the Middle East; and Late Kurgan of the third millennium B.C., in which the people maintained a relatively homogeneous culture. After the Late Kurgan period, these peoples expanded and diversified all over Europe and the Near East, coming to be what we traditionally know as the Indo-Europeans. This expansion is illustrated on the map in figure 5-2.

In the conclusion to her article "Proto-Indo-European Culture: The Kurgan Culture during the Fifth, Fourth, and Third Millennia B.C.," Gimbutas noted:

In reference to Proto-Indo-European culture, the archaeological evidence shows the following:

1. The Kurgan culture in the Pontic and Volga steppes of the fifth and fourth millennia B.C. was fairly homogeneous. Therefore it can be regarded as a proto-culture of all later Kurgan manifestations in Bronze and Iron Age Europe and the Near East.

2. The process of its formation is not yet clearly demonstrated by archaeological data. The present evidence shows three or four Mesolithic and Neolithic culture groups north of the Black Sea. The Kurgan culture most probably developed from a Mesolithic group in a limited geographical area between the Don River and the southern Urals.

3. During the fifth millennium B.C. the Kurgan people were in possession of domesticated horses and the vehicle was probably introduced to the steppe area in the fourth millennium B.C.

4. Kurgan elements in economy, habitation pattern, social structure, and religion fully agree with the common words in Indo-European languages which have been used by linguists for the hypothetical reconstruction of the mother culture.³⁰

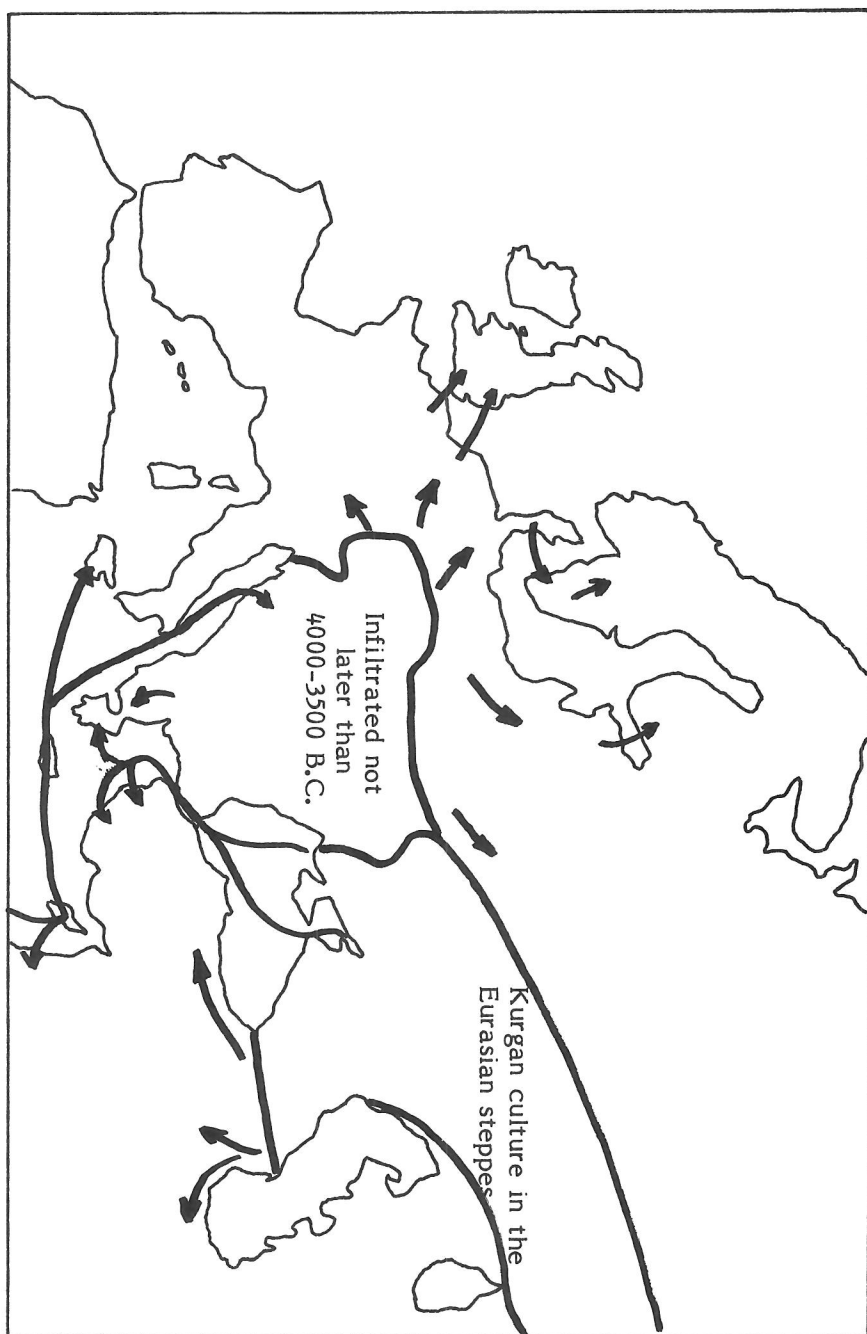


Fig. 5-2. Dispersal of the Kurgans
(adapted from Gimbutas 1970)

Thus, the Kurgan people first settled in the Russian steppes and then expanded westward into Europe, infiltrating and dominating the peoples already there. The Kurgans imposed their cultural practices and language upon these Europeans. From their "new" European homeland, they then expanded once more, this time carrying their culture and language in all directions from the central European area later associated with the Germanics.

5.3.c Conclusion

It is not enough to examine the evidence to support the Kurgan principle without putting this into the perspective of time and also of the effect of time on the ethnolinguistic principle. If the Kurgan migration and expansion had taken place within a few generations, we would still speak of an Asiatic (or at least a Eurasiatic) origin of the protoculture. After all, the Kurgans did come from somewhere in the east.

However, the span of time within which all of this takes place is approximately three thousand years—from one hundred to one hundred and fifty generations (depending upon life expectancy and childbearing years).³¹ To say that the Kurgans brought an Asian or Eurasian language and culture to central Europe and then later spread this same language and culture throughout Europe would be a gross oversimplification and quite a misleading one. Throughout the time in which the Kurgans occupied central Europe, their customs developed with the influences of their new neighbors and of the peoples they now dominated, and their

language changed not only from the pressures and vacillations that affect languages even in isolation but also from the linguistic contact with those peoples who already inhabited Europe.

To say, then, that the Kurgans brought with them a language from the Russian steppes and then spread that language from their "new" central European homeland out in all directions is simply incorrect. What they spread from their central European homeland of thousands of years' duration is a language developed from the original language of the Kurgans with many changes and borrowings. To say that it was the same language would be to say that French is the same language as the Latin of two millennia ago, as it was first introduced to the Gallic peoples, or that the English language and customs are the same as the German.

If we are to go back before the lengthy period of relative stability in which the Kurgans occupied central and eastern Europe and assert that the language of these Kurgans was really some Eurasian language and not European would lead to a simple extension of the argument ad absurdum: If the millennia of establishment in Europe was not enough to justify the development of a culture peculiar to these now-European people, then we must consider where the Kurgans might have come from prior to their settlement in the Russian steppes. Surely, they did not simply appear in the steppes, but migrated from somewhere else. They may have been less established in the steppes than they were in Europe, in which case resisting the European homeland hypothesis would make less sense than resisting the Eur-

asian.³²

Perhaps the most likely reason for insisting that the homeland be the Russian steppes rather than Europe would be racial—the Kurgans were definitely a different race than were the people already settled in Europe. Such a position, however, would clearly violate the ethnolinguistic principle, with its basis in anthropology and even in neurolinguistics. Once again, we must avoid the confusion between race and language.

Inasmuch as there is no racial reason for the language of the Kurgans to reflect their Caucasian racial origins (nor indeed are all or even many of the Europeans of this "Caucasian" racial heritage) and insofar as the culture settled and developed its practices and language in central Europe, we should speak of a central European origin of the Germano-European culture. This would place the homeland of the protoculture within or adjacent to the traditional area of the Germanic peoples (the Eastern Goths).

The placement of the homeland within the Germanic region using the evidence of anthropology and archaeology is strong corroboration for the hypothesis of a Germano-European protolanguage (and its subsequent division through an Indo-European sound shift). Coupled with the observations on areal linguistics made in section 5.1, we can now, with a great deal of confidence, put forth the hypothesis that the protoculture was established within or adjacent to the areas later known to be inhabited by the Germanic peoples and that the migrations and diversifications radiated from this area, with the Balto-Slavic peoples migrating northward and

♦

eastward, the Celts westward, the Italics and Hellenics southward, and so forth.

These migrations, with their infiltrations and subjugations of tenant peoples, brought about contact with many other Kurgan or Kurgan-related cultures, particularly in the east. Here again, though, the time difference comes into play. After several millennia without the benefit of long-distance communication, the languages subjugated would not have been recognizable to the Germano-European invaders as anything related to their own speech. As we have seen in the general linguistic ignorance among speakers of much more closely related languages (as reflected in the slow progress toward the recognition of relationships among European languages of the same subfamily), any chance retention of a common form among the clashing Kurgan cultures would not have been recognized anyway.

In the final analysis, no matter what cultures may have been involved in the expansion and diversification of the Germano-European peoples, the conservative group ought to have been located in or around the homeland. The lack of linguistic contact would ensure a slower rate of change and would also ensure that those changes that might take place would not be the result of contact with vastly different systems and would thus most likely be changes within the linguistic system inherent to the protoculture. This is precisely what is predicted in the hypothesis of a proto-Germano-European language--the simple development of the Germanic (and Armenian) consonant subsystems and the general shift among the Indo-European language groups.

NOTES

REFERENCES

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NOTES

CHAPTER 1

¹A good general introduction to historical linguistics is to be found in Anttila 1972; Hoenigswald 1960a and Paul 1975 are classics as well, though the former is a bit specific to its model of linguistics and the latter rather dated. For the reader without any linguistic background, it would be advisable first to read Bolinger 1975, especially Chapters 10-13. More technical sources for the principles of reconstruction and of comparative linguistics include Anttila 1968; Bonfante 1946, 1954; Ellis 1966; Hodge 1975; Katičić 1970; Meillet 1967a; Pike 1957; Szemerényi 1970; Thieme 1964. The references offered here and in subsequent notes should be taken as representative rather than exhaustive; and I offer my apologies to those whose works are not included.

²A further, very lucid explanation of the sound correspondence and its use in determining language relationships can be found in Anttila 1972:335-41.

³For those not specializing in the Romance languages, Posner 1970 offers a general linguistic introduction to these languages.

⁴In the determination of groups and subgroups, see Allen 1953. From a somewhat more typological point of view, there is also the classic Kroeber 1913.

⁵This is a hypothesis that comes in and out of fashion periodically. See, for example, Hudson-Williams 1935:18-19, Meillet 1964:43, Lewis 1931:9, Watkins 1966, and Cowgill 1970.

⁶Here, as in the example of the Romance languages, written history comes to our aid. While the Gaulish once

spoken in modern-day France produced no extensive writings, we can compare such elliptical evidence as personal names, as compiled in Evans 1967.

⁷The aspect of language as a primarily social vehicle is treated rather extensively in Halliday 1978. As for the determination of language prehistory, Haas 1969 is illuminating.

⁸The tree structure (*Stammbaumtheorie*) was pioneered by the early Indo-Europeanists, such as Brugmann (1884). Specific criteria for their construction can be found in Hoenigswald 1966, and techniques and competing models in Southworth 1964. There are, however, alternative methods of viewing the relationships expressed in the tree—for instance, the wave theory (*Wellentheorie*) as in Porzig 1954. A comparison of methods can be found in Pulgram 1953 and also in Anttila 1972:Chapter 15.

⁹Here it is appropriate to consider migration theory, as expounded in Dyen 1956. For further principles, see Diebold 1960; and for more general issues of language diversification, see Swadesh 1972.

¹⁰As with all concepts in historical and comparative linguistics, the substratum has its guiding principles and theories, particularly in conjunction with structural linguistics—see Nielsen 1952 and Szemerényi 1964. For an application of substrata to the very problem at hand—the relationship between Germanic and Indo-European—Esau 1973 provides an excellent and insightful example, though one at great odds with the hypothesis proffered here from the standpoint of phonetic plausibility.

¹¹At this point, we come into contact with internal reconstruction and its relation to comparative linguistics. On this subject, the references already cited in note 1 should be of great value, especially Hoenigswald 1960a. For more precise principles of internal reconstructions, see Kurylowicz 1964; and for the limits of the method, see Miranda 1975.

¹²The concept of the sound law is treated throughout this section as well as in the following chapter, and the references cited in the next chapter should be consulted. In addition, definitions and examples can be found in all texts, for example Anttila 1972:57-58.

¹³All forms used in reconstruction and all reconstructed forms themselves are taken from Pokorny 1969. Page num-

bers are not provided, inasmuch as the work cited is well indexed by language and form.

¹⁴This division is always treated in books on the comparative method and the Indo-European language family. See especially Krahe 1970.

¹⁵A technical but very enlightening aerodynamic phonetic study of murmur in Sindhi can be found in Nihilani 1974. Indeed, all of the stops are treated, a fact that helps put murmur into its systematic perspective.

¹⁶Here we come into direct contact with Grimm's Law--the traditionally held hypothesis on the relationship between Germanic and the other Indo-European languages. Once again, the references cited in the next chapter should prove useful. Also useful are works on Indo-European in general, such as Krahe 1962 and Meillet 1967b. In a more nontechnical vein, there are also Baldi 1983 and Lockwood 1972.

¹⁷The matter of degrees along the fortis-lenis scale being pertinent or not to the shift is handled within the framework of parametric linguistics by Heller and Macris 1967:11-18. This reference is particularly revealing in that it treats Grimm's Law specifically.

¹⁸The hypothesis regarding the labio-velars is tied together with the change from palatal [c] to sibilant [s] among the satem languages (compare section 5.1.c). In such works as Lehmann 1952, this group of sounds including [g^w], [g^w], [k^w], and [x^w] is considered to be an integral part of the Indo-European phonological system inasmuch as it blocked the application of the satem change. While there is much merit to including this group in the basic consonant system, such inclusion would not at all affect the hypothesis proffered here--the labio-velars simply follow the pattern of the velars (nonpalatals). The group is generally excluded here, then, in an effort to make the presentation simpler and clearer (without loss of significant accuracy).

¹⁹The classic work in this field is B̄artoli 1925. A technical appraisal can be found in Bottiglione 1954, and a very lucid nontechnical approach within Bolinger 1975:Chapter 11. It is basically from this latter work that the terms and explanations of the norms themselves are drawn.

²⁰Bolinger (1975:356) cites this and other examples.

²¹The effects of borrowing on the vocabulary of a (prehistoric) language can be seen most clearly within the

approach of lexicostatistics--compare Embleton 1982, for example. A more general introduction to the approach and its use in historical reconstruction can be found in Gleason 1959 and Swadesh 1952 (see the latter for prehistoric contacts specifically).

²²Perhaps the most extensive treatment of language universals within typological theory can be found in the series of works edited by Greenberg (1978). For the use of typology in historical linguistics, see Schmidt 1966. References from typological theory as it relates specifically to the matter at hand are cited in the notes to section 5.2.

²³Here the classic work is Jakobson 1941. Jakobson ties typological universals in with evidence from aphasia and also with general sound laws.

²⁴See, for example, Lyons 1968:187-92.

²⁵The different types of alternation can be seen in the nonphonetic approach of Foley 1977, and specifically with regard to the first Germanic sound shift in Foley 1970. Inasmuch as Foley does use a nonphonetic approach to phonology, I dispute his findings (for example, Griffen 1977a). Nonetheless, his formulation does show the phonological relationships fairly clearly, matters of approach and theory aside.

²⁶On typology and the nasal vowels, an extensive treatment can be found in Ruhlen 1978. Ruhlen reaches this conclusion as well, though not specifically with application to historical linguistics as such.

²⁷It should be noted, however, that the use of a phonological system is a basic part of linguistics in general, going all the way back to Saussure (1959).

²⁸The use of phonetics (or "realism") in reconstruction can be found in such works as Allen 1951, Hall 1960, Hoenigswald 1960b and 1965, and Schramm 1967. The last work, while somewhat indirect, takes the phonetics into the opposition of features themselves.

²⁹See, for example, Russ 1978:19-20.

³⁰See, for example, Griffen 1977d.

³¹Compare the concept of the principium divisionis in Prague School phonology--Jakobson 1929. That is, the principal feature determines to some extent the types of alternation and the manners in which the other features are affected.

³²Also of some importance here are the logical relation-

ships involved. See, for example, Mulder 1968. For the application of logical relationships to language change, see Andersen 1973. Care must be taken in these relationships, however, as seen in the analysis of the Swabian voiceless vowel, treated further in section 5.2.a (see Griffen 1983).

³³This argument is found in Jakobson 1958.

³⁴Once again, see Nihilani 1974.

³⁵The general theory of markedness grew out of the Prague School of linguistics in the 1920s and 1930s. Perhaps the classic presentation of the use of markedness in phonology can be found in Trubetzkoy 1969.

³⁶The use of markedness theory in historical linguistics is of long standing. Of particular interest to the history of Germanic is Vennemann 1971. Vennemann incorporates much of the generative theory into his presentation, though the underlying concepts are still rather traditional.

CHAPTER 2

¹Throughout this chapter, we are concerned with the history of linguistics. The main sources for the historical information used throughout include such general works as Robins 1968 and Dinneen 1967. On the history of linguistics, with specific reference to the development of comparative Indo-European linguistics (particularly in the nineteenth century), Delbrück 1974 is clearly a classic, and the introductory chapter of Lockwood 1969 is extremely concise and clear. In addition, the phonetic/phonological aspect of change is excellently presented in Pedersen 1983 (a new translation of the classic), and the anthropological/comparative aspect is treated in Hoenigswald 1963. Finally, of great usefulness, especially to the reader who is not familiar with German or who may not have the classic works of the nineteenth century available, Lehmann 1967 is indispensable (and the introductory comments to each reading quite enlightening). As these are my main sources, I shall refrain from further notes on these works, except where specific page numbers may be called for.

²Just how good a basis for comparison these languages provide can be seen in the short introductory work by Hudson-Williams 1935.

³Some further appreciation for this restriction, in addi-

tion to that expressed by the sources in note 1, may be found in Robins 1951. Certainly, at this time scholasticism was well on the way (see, for example, Haskins 1957); nonetheless, the works of Giraldus did in fact come in at the end of the twelfth-century Renaissance (compare Leff 1958) and some of the rather more enlightened observations made by Giraldus may be thus explained.

⁴Here the English edition by Thomas Wright (*Giraldus Cambrensis* 1881:391-92) is cited. All works quoted are cited in published translation, wherever possible.

⁵On the *Historia Regum Britanniae* in particular, see Geoffrey of Monmouth 1958 with its excellent introduction; as for the effects of the Trojan myth on Welsh society in general, see Williams 1979.

⁶I use the 1939 edition of Robert's work, well edited and with an outstanding introduction by G. J. Williams. Unfortunately, no English translation has ever been published (to my knowledge), and the work as well as the introduction is limited to those with some reading knowledge of Welsh.

⁷For an insight into just how Robert's accomplishment (with regard to this particular issue) fits into the overall history of Welsh grammatical scholarship, note the comments of Morris Jones (1913:iv-v).

⁸My translation from Roberts 1939:102-103. In this passage and in table 2-1 as well, I have taken the liberty of correcting the Latin citations (and putting the verb forms into the infinitive) and also of updating the Welsh spelling.

⁹Lhuyd 1707 has recently been reissued (facsimile), as noted in the References. In spite of its importance, references to this work are quite rare and sketchy where they do exist (compare Lockwood 1969:21—but no mention in Robins 1968 or Dinneen 1967).

¹⁰Lhuyd 1707:3. In the original, the entire passage after the leading lines is in italics, which have here been omitted.

¹¹Lhuyd 1707:11.

¹²Lhuyd 1707:3.

¹³Lhuyd 1707:24. Once again, I have omitted the extensive use of italics in the introductory paragraph. The only items not italicized in the original are "Initial," individual letters, and names of languages.

¹⁴The classic work on mutations is Morgan 1952, and cursory explanations can be found in most Welsh grammar texts. For the reader with linguistic interests, Hamp 1951 is

illuminating. The matter is further discussed in Griffen 1975: Chapters 1 and 2 (and *passim* throughout), and it is treated in the dynamic framework introduced in the next chapter in Griffen 1985: Chapter 7.

¹⁵ This particular quote is taken from Lehmann 1967:15, though references to and quotations from this passage are common (with some slight differences—compare Lockwood 1969:22; Baldi 1983:3).

¹⁶ Schlegel 1808 (reprinted in 1974, as noted in the References).

¹⁷ Theories and assumptions in the natural sciences have long influenced linguists. For a rather recent application of Darwinian evolution, see Hymes 1961.

¹⁸ Bopp 1816.

¹⁹ Lockwood 1969:23-24.

²⁰ Rask 1818.

²¹ Lehmann 1967:32.

²² This is stated rather explicitly in Grimm 1893, as quoted below.

²³ Lehmann 1967:49, 51.

²⁴ Perhaps the most important representation of the work of Grimm's followers in this regard can be found in Brugmann 1972 (originally 1886).

²⁵ This is graphically illustrated in Lyons 1968:123-26 in terms of the distinctive features used in modern phonology.

²⁶ The distinction between an exception and a counterexample has been made in modern linguistics by Hjelmslev (1970:30-31). An exception is simply a random irregularity that cannot be predicted; while a counterexample is a conflicting regularity—a rule within (and counter to) a more general rule. Verner's Law is technically a counterexample, in that it does follow a rule, but its rule contradicts the more general rule of Grimm's Law.

²⁷ Verner 1875.

²⁸ Lehmann 1967:145-46.

²⁹ Lehmann 1967:148-49.

³⁰ This traditional position was overturned early in the twentieth century by structural linguists, who demonstrated the tremendous problems with using orthography for linguistic analysis. In particular, see Saussure 1959: 23-37.

³¹ That is, the various components are in a state of homeostasis (homeostatic equilibrium). This concept is well explained in Lyons 1968: 90-91. On the equality of overall

language structure, see Bloomfield 1933 and Sapir 1921.

³² Again, we find here the influence of the natural sciences on linguistics. While this description of entropy through chemical process was an important assumption in the nineteenth century, it has been replaced by the natural analogy with biological models--compare Anttila 1972:Chapter 22.

³³ Thus, the homeostatic equilibrium, which replaced the old notion of superior and inferior languages (languages with and without writing or "grammars"), also plays an important role in discounting the notion of linguistic entropy.

³⁴ On the origin and diversification of language, the classic work is Swadesh 1972.

³⁵ This is demonstrated quite effectively for Europe by Ripley 1899, who pointed out that the racial types of Europe that existed before the Caucasian infiltration were basically unchanged by the Caucasians. The lingering term Caucasian for some homogeneous European race, however, is evidence of the entrenched position of the traditional, outmoded view. This is discussed further in section 5.3.

³⁶ As shown, for example, Gimbutas 1970. Once again, this is treated in more detail in section 5.3.

³⁷ In recent years, there has been considerable activity in updating the prevailing notions regarding the reconstruction of proto-Indo-European. See, for example, Schmalstieg 1973 and 1980. More on this subject is found in section 5.2.

³⁸ Meillet 1970:9.

³⁹ Trubetzkoy 1969:76-77.

⁴⁰ See Griffen 1977b, 1982c, 1984.

⁴¹ This is rather explicit in Grimm 1893. Compare also Foley 1970.

⁴² The arguments that the High German sound shift was highly contextually motivated (that is, caused by specific pressures in the environment of the sounds affected) and that it was not a shift in the classic sense are made in Griffen 1981c.

⁴³ This assumption guided my earlier hypotheses, as in Griffen 1979, 1980b, 1982b, and 1984.

⁴⁴ Lehmann 1967:149.

⁴⁵ Meillet 1970:27.

⁴⁶ On this topic, it would be helpful to compare Moulton 1954.

⁴⁷ The role of variation as a source of language change

and diversification has been treated by Fónagy (1956/1957 and 1967) and by Weinreich, Labov, and Herzog 1968.

⁴⁸ On this point, however, we should compare migration theory, as in note 9 to Chapter 1. The type of standardization that has taken place in some migrations (such as the westward migration in the United States and the eastward migration in Germany), though, would not be a factor here, as the groups would have been radiating outward, rather than coming together.

CHAPTER 3

¹ As one finds in three journal articles in print. In Griffen 1979, some of the more technical phonetic aspects of the hypothesis are described; in Griffen 1982b, the hypothesis is presented to the nonspecialist philologist; and in Griffen 1980b, it is presented in summary.

² On phonetic reconstruction, see Allen 1951, Hall 1960, Hoenigswald 1960b and 1965. The concept of phonetic change leading to structural, phonological change was pioneered in Sturtevant 1947 and in Martinet 1955; see also, though, Penzl 1957.

³ For instance, the phoneme itself is most often considered an abstraction from the phonetic evidence, or as described in Twaddell 1935 a "convenient fiction." This abstract nature has also been treated as an idealization of a target or range, as in Jones 1950, or of a segmental state (from the dynamic continuum), as in Hockett 1955. More recently, generative theorists (such as Halle 1962) have replaced the old phoneme with a deeper, more abstract underlying representation. In all of this abstraction, the basic end product has been what amounts to a letter (be it written as such or as columns of inherent features)—an abstract, idealized symbol in its "pure" written form, untarnished by actual spoken language. On this point, compare also Trubetzkoy 1968 and Pilch 1974. Perhaps the clearest indication that we are dealing in phonemics essentially with letters rather than with sounds can be found in the notational systems deriving from them—such as Trager and Smith 1951; see particularly Gleason 1961. While distinctive features may appear to have displaced the letterlike phonemic symbols, they do in fact occur in matrices in the same neat,

discrete left-to-right progression. On this point, Householder 1965 is quite perspicuous. Indeed, the entire exchange of which that article is a part reveals much of the orthographic nature of phonemes, be they traditional Bloomfieldian or generative. This exchange is well documented in Makkai 1972. It is not only in the traditional generative approach to phonology that the letterlike phoneme is in effect the object of study. In the most recent models of autosegmental phonology (see Goldsmith 1976), the nonsegmental nature of phonetics is indeed recognized, but the model simply uses the findings of acoustic phonetics to abstract phonemic segments. On the other hand, metrical phonology (compare Giegerich 1985) takes into account the larger-than-segment relationships, but then translates these into segments in its final step as well.

⁴On the arbitrariness of alphabetic writing systems, see Gelb 1963, in which the history of alphabetic writing is traced.

⁵This aspect of the opposition is treated at length in Meillet 1970: Chapter 2.

⁶Indeed, phonetic alphabets were developed simply to furnish a more reliable and consistent orthography (see International Phonetic Association 1949), although some of the early work of Sweet (1884, 1909) strove to represent the sounds with extremely precise symbols relating to the vocal apparatus. Even Saussure (1959:23-37), in his well-known attack on the orthographies of his day and his championing of phonetic alphabets, treated his phonetic symbols basically as a consistent (possibly universal) orthography. In this vein, see especially Pike 1943 and 1947.

⁷For speakers of many dialects of American English, this example may seem puzzling. In these dialects, every vowel is a vowel of motion, beginning and ending as a schwa—a mid-central vowel. Thus, while speakers of other dialects and languages may perceive a distinct difference occurring during the consonant, speakers of these dialects may not (compare Griffen 1977c). For these speakers, it might be more instructive rapidly to pronounce the nonsense words [ifi] and [ufu].

⁸For an overview of the development of phonology, see Makkai 1972 and Fischer-Jørgensen 1975. The former is a collection of the main articles relating to the phonology in the twentieth century, while the latter treats each school of

phonology by itself and in comparison with one another. In addition, many phonology texts include historical information, such as Sommerstein 1977.

⁹In dynamic phonetics, the inaugural article is Curtis 1954. Works that have had a particularly strong influence on the development of dynamic phonology have been Mermelstein 1973, Öhman 1966 and 1967, Sawashima and Cooper 1977, Gay 1977, and Bell-Berti and Harris 1979, although there are many more.

¹⁰For the physiological processing involved in the production of speech, Minifie, Hixon, and Williams 1973 serves as an excellent introductory text. For the nonspecialist, a more basic introduction to phonetics in general may be found in Denes and Pinson 1973 (developed for use in high schools). A more advanced treatment, though still quite readable for the nonspecialist, may be found in Malmberg 1963. In a much more technical vein, physiological phonetic studies that have contributed to the model include such classics as Peterson and Shoup 1966. On the development of cineradiography in the determination of precise physiological phonetic aspects of the speech event, see Öhman and Stevens 1963, Heinz and Stevens 1964, Perkell 1969, and Ondročková 1973.

¹¹The acoustics of speech production and perception have played a vital role in the development of phonetics, particularly of dynamic phonetics. For the nonspecialist, I recommend Ladefoged 1962 and, again, Denes and Pinson 1973 and Malmberg 1963. These sources explain the acoustics quite clearly and accurately, without using too technical jargon or advanced methodology. For the specialist, there is Flanagan 1972. On the development of the sound spectrograph, which has played a prominent role in dynamic phonetics, see Koenig, Dunn, and Lacy 1946 and Cooper, Liberman, and Borst 1951. These and many more classic articles on acoustic phonetics may be found in Lehiste 1967.

¹²See, specifically, Mermelstein 1973 and Öhman 1966 and 1967.

¹³The locus theory of consonant production and perception is set forth and lucidly explained in the classic article by Delattre, Liberman, and Cooper 1955.

¹⁴Cross-sectional segmentation is here taken as the traditional manner of dividing up the sound continuum simply by slicing through it (as explained below). It should not be

confused with the type of segmentation performed by Fant (see 1973 for an excellent collection of articles on speech sounds and features). In Fant's terminology and methodology, segmentation is an abstraction from the dynamic speech event by feature type. As such, it is quite similar to the type of abstraction performed in dynamic phonology; and indeed, it has had a significant influence on the development of dynamic phonology as well. (Compare especially Fant 1962.)

¹⁵ This problem and the dynamic phonological solution to it are treated in depth in Griffen 1977b. For other aspects of the dynamic argument against allophony, see Griffen 1978b and 1982a.

¹⁶ Figure 3-1 is based upon a similar figure in Liberman 1970, in which the researcher strives to find a way to create a generative-like grammar of speech, mimicking that of language. Much the same tactic, but on a grander scale, is to be found in the autosegmental model by Goldsmith 1976, who actually does manage to analyze speech dynamically, but then uses the information gained simply to redistribute features into segments. The reluctance of segmental phonologists to abandon the segment and to develop dynamic models can be traced to traditionalism, in which dynamic coarticulation is recognized but resisted because the segment has given good service in the past (see Anderson 1974:6-7). There is also resistance from the generativists, as dynamic phonetics is not suited to the generative framework. As demonstrated in Halle 1972, the generative attitude to phonetics is that this field should adhere more stringently to the notational devices and methods of generative phonology. For a discussion of these issues, see Griffen 1978a.

¹⁷ Once again, see Householder 1965 on the correspondence between columns of features and phonemic units.

¹⁸ Here it is noteworthy that the London School of prosodic (Firthian, or system/structure) analysis has gone a long way toward eliminating the segment, though not from the starting point of dynamic phonetics per se. In this field, the classic article is Firth 1948. Henderson 1949 takes the prosodic method quite close to its logical, totally nonsegmental extension, though the vagueness of the framework would not allow the ultimate step to dynamic phonetics (compare Roberts 1979). For an explanation of prosodic

analysis, see Robins 1957; and for a more modern survey, see Mitchell 1975.

¹⁹The dynamic phonetic basis of dynamic phonology lies in the works cited in note 9 and elsewhere. As for the phonological theory used in the development of dynamic phonology, the main contributors include (but are not limited to) such linguists as Trubetzkoy 1969 and the Prague School (see also Martinet 1949--the "Neo-Prague" School), Hjelmslev 1970 and the Copenhagen School, and especially Firth 1948 and the London School. In addition, there have been too many other contributors to list here; but a list could be constructed from Griffen 1975 and 1985 as well as from the articles cited in this work (including Griffen 1976).

²⁰The term parameter is used here as it is in modern phonetics--see, for example, Fant 1973. It should not be confused with the term as it is used in Pike 1943 and 1947 nor in the parametric linguistics of Heller and Macris 1967.

²¹On the dynamic phonetic basis for using the syllable as the recurrent organizational unit, see Mermelstein 1975. For some perspective on the development of this role for the syllable, see also Kozhevnikov and Chistovich 1965, Malmberg 1955, and Haugen 1956.

²²For example, see Griffen 1984 or, once again, Griffen 1985.

²³The maintenance of the feature (in opposition) as the basic inventory unit of the model cannot be overemphasized. This method is firmly grounded in the tradition of distinctive feature analysis, and its main innovation is simply the organization of these features into a more accurate and reliable organization. On the development of feature theory, see Singh 1976, Baltaxe 1978, and Blacke 1978.

CHAPTER 4

¹The concept of the fortis-lenis scale is quite traditional. For example, we find the terminology of the scale used extensively in Wright 1955 (originally 1888) and 1907.

²Some insightful and important research was progressing in this area, however. In this respect, see especially Malecot 1970; with regard to the aspirate nature of the scale, other important references are found in notes 9 and 10, below. With particular application to the fortis-lenis scale in lin-

guistic change, see Griffen 1985:Chapter 5.

³The classic presentation of the application of binary logic as such to the feature systems of phonology is found in Cherry, Halle, and Jakobson 1953. For a lucid and insightful overview of the binary feature, see Utaker 1974.

⁴The implications of the network organization of the brain for linguistics are set forth in Reich 1968. For some background into the relationship, it may also be helpful to consult the classic in this field--Penfield and Roberts 1959.

⁵The Trubetzkian approach to features (oppositions) is most effectively expounded in Trubetzkoy 1969, while the Jakobsonian binary feature concept can be seen in its development in Jakobson 1962. For more insights and discussion of the differences between the two approaches, see Baltaxe 1978.

⁶See especially the introduction to Foley 1977, in which the theoretical principles for taking the nonphonetic approach to phonology are argued.

⁷Vennemann and Ladefoged 1973 is of particular interest here in its attention to the problem of the gradual fortis-lenis scale and its relationship to phonetics and phonology. On the "inner approach," see Jakobson and Halle 1971.

⁸This observation and the supporting data are to be found in Perkell 1969:36-37.

⁹See Lisker and Abramson 1964 and 1967.

¹⁰Other studies that directly or indirectly support the parameter of aspirate tension as the basis of the fortis-lenis scale include Kim 1970, Petursson 1976, and Palmer 1964; Kent and Moll 1969, Bell-Berti 1975, and Malécot 1955 (compare also 1970).

¹¹This spectrographic study is presented in Griffen 1975:Chapter 10. See also Griffen 1977a and 1985:Chapter 5.

¹²Regarding the concept of "consonantness," it may be helpful to review the references cited in the notes to Chapter 3, above. As for this specific argument relating to intervocalic consonants (as opposed to initial consonants), see Griffen 1984.

¹³The issue of provection is addressed perhaps most extensively in the historical treatments of the Celtic languages--see especially Lewis and Pedersen 1937, Jackson 1953. For analyses of provection within the dynamic phonetic/phonological framework, see Griffen 1980a, 1981b, and

1985; Chapters 5 and 13.

¹⁴This shift is analyzed in the dynamic framework in Griffen 1981c; see also Griffen 1981a with specific regard to the developments of the New High German affricatae.

¹⁵This early development from a two-member to a three-member system prior to the shift is rather closely duplicated in Celtic, as pointed out by Sommerfelt 1962. Indeed, there is a remarkable degree of similarity between the more attested shift in Welsh (see Griffen 1975, and more generally Jackson 1953) and that reconstructed for Indo-European here. In both, the general pattern was one of lenition within an aspirate fortis-lenis system, along with specific, contextually motivated instances of protraction. To some extent, then, the precedent found in the Welsh shift may be used as fairly strong typological evidence for the type of shift under study and for the Indo-European sound shift as posited later in this chapter. Closer connections between the Welsh shift and the Indo-European have been made in Griffen 1979 and 1982b. (For the Swabian references, see Griffen 1983.)

¹⁶For further developments in Greek and Latin from the starting point of an Indo-European sound shift and within the framework of dynamic phonology, see Griffen 1982c.

¹⁷The concept of generalization of the unmarked member of an opposition beyond the environment that caused the initial change can also be handled within the bounds of markedness theory and neutralization; see Griffen 1977d.

¹⁸For example, we should recall the restatement of Grimm's Law within the approach of feature analysis in Lyons 1968:123-26.

¹⁹Language is transmitted from generation to generation, and such change as that of a general shift may be seen to occur when the learner of one generation "reinterprets the acoustic signal" (Anttila 1972:198) from the data given by the informant from the previous generation. This process of change by reinterpretation places a great importance on physiological and acoustic phonetics, as well as on language structure.

²⁰By structural change, I mean a change in the relationships among features or oppositions. If, let us say, there is an opposition between [t] and [d] (used as symbols for degrees along the pertinent parameter) based on aspiration and the [t] changes to [t^h] in all environments, then there is

really no structural change coming out of the simple phonetic change, for the two degrees are still opposed to one another along the same parameter. If, however, some but not all of the instances of [t] change, then there is a structural change--from a two-member system (structure) to a three-member system. Compare, for example, Martinet 1952 and 1955.

²¹As in all such forms used from this point on, this is developed from the form originally reconstructed by Julius Pokorny (1959) on the assumption of the first Germanic sound shift--trei--but adjusted here to keep it in line with the newer hypothesis of the Indo-European sound shift.

²²See, for example, Weinreich, Labov, and Herzog 1968 and other works in note 46 to Chapter 2. Indeed, a logical extension of this principle would hold that the protolanguage being reconstructed did not maintain a single, unified phonological structure either--an argument discussed further in section 5.1 (relative to the two dialects) and in Dyen 1963 and 1969, Marchand 1955, and Pulgram 1959.

²³This method is described in all introductory texts, such as Lyons 1968.

²⁴The "natural class" is "a class of segments that can be specified with fewer features than any member of the class" (Harms 1968:26). For example, from general to specific, consonants comprise a natural class, as do obstruents, stops, and voiceless stops.

CHAPTER 5

¹On Armenian in general, see Godel 1975 and Thomson 1975. For a more linguistic approach, see also Hübschmann 1962 and Meillet 1913 (both classics in the field). On the important historical aspects of Armenian phonology, Pedersen 1905 is still quite useful; and on the traditional view of the position of Armenian within the Indo-European language family, see Hübschmann 1875 and Solta 1960.

²The data for Armenian as compared with other Indo-European languages are taken from Brugmann 1972:357-58 (and other pages as cited there).

³The deaspiration after [s] is so strong a tendency that it overcomes the aspiration of a Welsh aspirata, reducing it to a media, in spite of the prominence of aspiration in the

phonological system of that language; compare Griffen 1976.

⁴Indeed, the Latin change is practically identical, as it is presented in Griffen 1982c.

⁵Lockwood 1969:89-90.

⁶This argument has been put forth relatively recently in Emonds 1972. It should be added, however, that the father of areal linguistics, Matteo Bàrtoli 1933 also argued that Germanic be considered the most conservative of the Indo-European subfamilies. Bàrtoli's evidence was not only areal, but also morphological, which should prompt more linguists to consider his arguments.

⁷The matter of the protolanguage's homeland is treated extensively in section 5.3 from an anthropological standpoint. For a more linguistic perspective, Thieme 1953 should be consulted.

⁸Perhaps some residual effect of this tendency toward isolationism among the Germanics may be seen in the Germania of Tacitus 1942. While the Roman historian was writing at a considerably later time (the first century A.D.), the extreme practice of laying waste large tracts of frontier area to create a no-man's-land must have developed over a period of centuries and may well have had its origin in the disruptions of these Indo-European migrations.

⁹The acoustic values involved with the fricatives (and sibilants) are derived from the classic experiments presented in Strevens 1960.

¹⁰Strevens 1960 notes that the noise associated with the fricative [ç] begins at around 2,800-3,600 cps. Insofar as this type of sound was probably an intermediate stage from the palatal stop to the sibilant, these values may also be significant, and they do support the hypothesis presented. For the progressive values of dorsal fricatives constraining vowels from back to front, a very revealing source is Glave 1974. This progression demonstrates quite clearly the rise in noise-level frequency as the fricative approaches and enters into the sibilant noise range.

¹¹Once again, the voice-onset-time experiments of Lisker and Abramson (1964 and 1967) may be consulted. In addition, the actual recognition by the hearer of this delay has been treated further in Roberts 1972.

¹²Here I use the values in the classic experiments of Peterson and Barney 1952. Of course, no matter what the precise measurements may be, the relative rise in second-

formant frequency for the front vowels is well established throughout the acoustic phonetic literature.

¹³ Once again, for the development of the affricata in the High German sound shift, see Griffen 1981a and 1981c; and for the affrication of the Welsh dental, see Griffen 1975 and 1976.

¹⁴ Here we once more see that the uniformity principle--that Indo-European must have maintained one homogeneous dialect--must not have applied. See the references included in note 45 to Chapter 2 and note 22 to Chapter 4.

¹⁵ General references for language typology are found in the notes to section 1.3.b.

¹⁶ In addition to the references on the phonetic basis of language change (note 28 to Chapter 1 and note 2 to Chapter 3) we may add Hockett 1965 and Koch 1970.

¹⁷ The full analysis of the Swabian voiceless vowel can be found in Griffen 1983.

¹⁸ Specifically, this section is based upon Bomhard 1979, 1984, 1986; Gamkrelidze and Ivanov 1973; and Hopper 1973. Also of interest in this respect are Bomhard 1975, Gamkrelidze 1976, and Szemerényi 1967. It is noteworthy that while Bomhard's early work (particularly 1979) closely parallels the reconstruction proffered here, his later work (1986) more closely corresponds to the traditional typological view.

¹⁹ Lehmann 1952 is the classic work on the phonological system of proto-Indo-European.

²⁰ Bomhard 1979:74.

²¹ That is, they were variants of the tenues reconstructed in that typologically based system--not variants of the tenues in the Germano-European reconstruction, which correspond to the glottalics in the typological reconstruction.

²² Bomhard 1979:80. While this quotation may sound like hyperbole, it is actually quite correct at least insofar as the kind of reconstruction developed in the typological framework may be concerned.

²³ In general, the works presented in Cardona, Hoenigswald, and Senn 1970 are most valuable, especially the contributions by Gimbutas and Thomas, cited below. On the development of the comparative method in anthropology (parallel to the method in linguistics), see Eggan 1954 and Leach 1968.

²⁴ Broca's contributions as well as those of other early

neurologists are quite succinctly and lucidly presented in Penfield and Roberts 1959.

²⁵Ripley 1899:17. This is perhaps the single greatest work on the races and prehistoric cultures of Europe.

²⁶Geipel 1969:59.

²⁷Childe 1926:95. Childe's reference to the conservatism of the Sanskrit morphology reflected the prevailing attitude through the history of Indo-European studies and into the present. An important contradiction to this attitude can be found in Bårtoli 1933.

²⁸Knowledge of the Kurgans is by no means new. Indeed, Ripley (1899) presents it as already a given.

²⁹In this vein, Gimbutas 1970 makes a strong series of arguments, and this is the work from which the following points are derived. See also Gimbutas 1973.

³⁰Gimbutas 1970:190.

³¹On dating the dispersal of the Kurgans (Indo-Europeans) from their European homeland, see also Thomas 1970.

³²Hodge (1972 and 1978) has attempted to take the linguistic relationships all the way back to a time when this language family and Semitic may have diversified from a single source. Whether or not his arguments can be substantiated, taking the point of origin of the Indo-European ancestral language back before the time of the dispersal could be extended to the point that no significant insights into the relationships among the Indo-European or Germano-European languages could be attained. After all, we are working on the language groups from the point of dispersal, wherever and whenever that may have occurred.

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